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Mentophilonthus davidkrali sp. nov. from Nepal and India (Coleoptera: Staphylinidae: Staphylininae)

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Abstract. A new species of *Mentophilonthus* Levasseur, 1966 is described from Nepal and India: *Mentophilonthus davidkrali* sp. nov. Two new combinations are proposed: *Mentophilonthus notabilis* (Kraatz, 1859), and *M. quediiformis* (Cameron, 1932) are transferred from *Philonthus* Stephens, 1829. New synonymy: *Mentophilonthus notabilis* Kraatz (= *Philonthus sikkimensis* Biswas, 2003) The new species is compared with the closely related *M. notabilis*. The aedeagi and important body details of the new species and of *M. notabilis* are figured.

Taxonomy, zoogeography, new combination, new species, synonymy, key, Coleoptera, Staphylinidae, Staphylininae, Philonthina, Palaearctic region, Oriental region

INTRODUCTION

The genus *Mentophilonthus* was described by Levasseur (1966; typus generis: *M. triseriatus* (Bernhauer, 1928); originally described as *Philonthus* Stephens, 1829), for some exclusively Afrotropical species. The genus may be recognized by the well developed infra-orbital ridge, reaching anteriad at least to mid-length of head and mesad toward gular sutures. In addition, the species have large, rather flat eyes, and many of them show a distinct and dense micro-punctation between the setiferous punctures of the elytra, giving them a remote resemblance with some *Quedius* Stephens, 1829 species of the subgenera *Quedionuchus* Sharp, 1844 and *Distichalius* Casey, 1915 The fact that two Asian species (*Philonthus notabilis* and *P. quediiformis*) also belong to *Mentophilonthus*, went unnoticed for a long time.

This paper serves primarily to officially transfer the above mentioned two species, and to describe a new species (*Mentophilonthus davidkrali* sp. nov.) which was detected among unidentified material originating from Nepal and India. More detailed descriptions and illustrations of the generic characters and the Asian representatives, including a key to species, will be presented in a future paper by the junior author.

MATERIAL AND METHODS

Abbreviations

The material used in this paper is deposited in the following collections.

CHP – coll. Lubomír Hromádka (Praha),
CSB – coll. Michael Schülke (Berlin),
NME – Naturkundemuseum Erfurt (Matthias Hartmann),
NMW – Naturhistorisches Museum Wien.

In addition to the above mentioned persons, the authors are grateful to Dr David Král (Charles University in Prague) who presented the holotype to the senior author.

Mentophilonthus notabilis (Kraatz, 1859) comb. nov.

(Figs 1, 3, 5, 7, 8)

Philonthus notabilis Kraatz, 1859: 79.
Quedius taprobanus Cameron, 1918: 171.
Philonthus sikkimensis Biswas, 2003: 272; **syn. nov.**

Distribution and bionomics. The species is very common throughout the entire Oriental region and the southern parts of the Palearctic region: Pakistan, Nepal, India, Sri Lanka, Andaman Islands, Myanmar, Thailand, Laos, Vietnam, S-China, S-Japan (Ryukyu Islands), Singapore, Malaysia, Indonesia, Philippines.

Mentophilonthus notabilis is a typical lowland species, preferably inhabiting the edges of stagnant water bodies. The species may be collected at light, especially in rural areas (paddy fields) in large numbers, usually in association with *Philonthus variipennis* Kraatz, 1859 and *P. paederoides* Motschulsky, 1858.

Remark. We have not studied the type material of *P. sikkimensis*. The original description is highly inadequate which made it difficult to decide whether it should be assigned to *M. notabilis* or *M. davidkrali* sp. nov. However, there are two characters (proportion and color of the pronotum) which support the synonymy.

Mentophilonthus quediiformis (Cameron, 1932), comb. nov.

Philonthus quediiformis Cameron, 1932: 76 (replacement name for *Q. nilgiriensis*).
Quedius nilgiriensis Cameron, 1920: 219 (preoccupied).

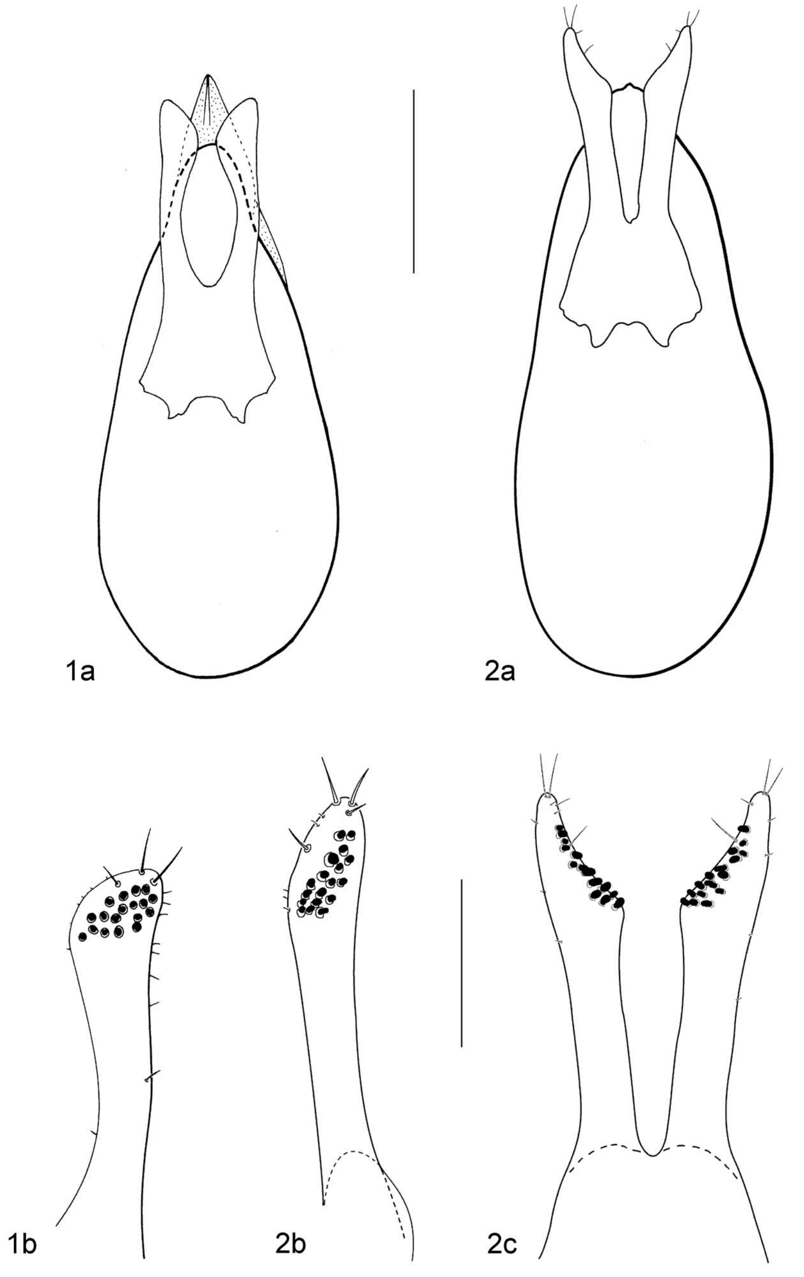
Distribution. The species is known only from the Nilgiri Hills and Cardamom Hills in southern India (Cameron 1932).

Mentophilonthus davidkrali sp. nov.

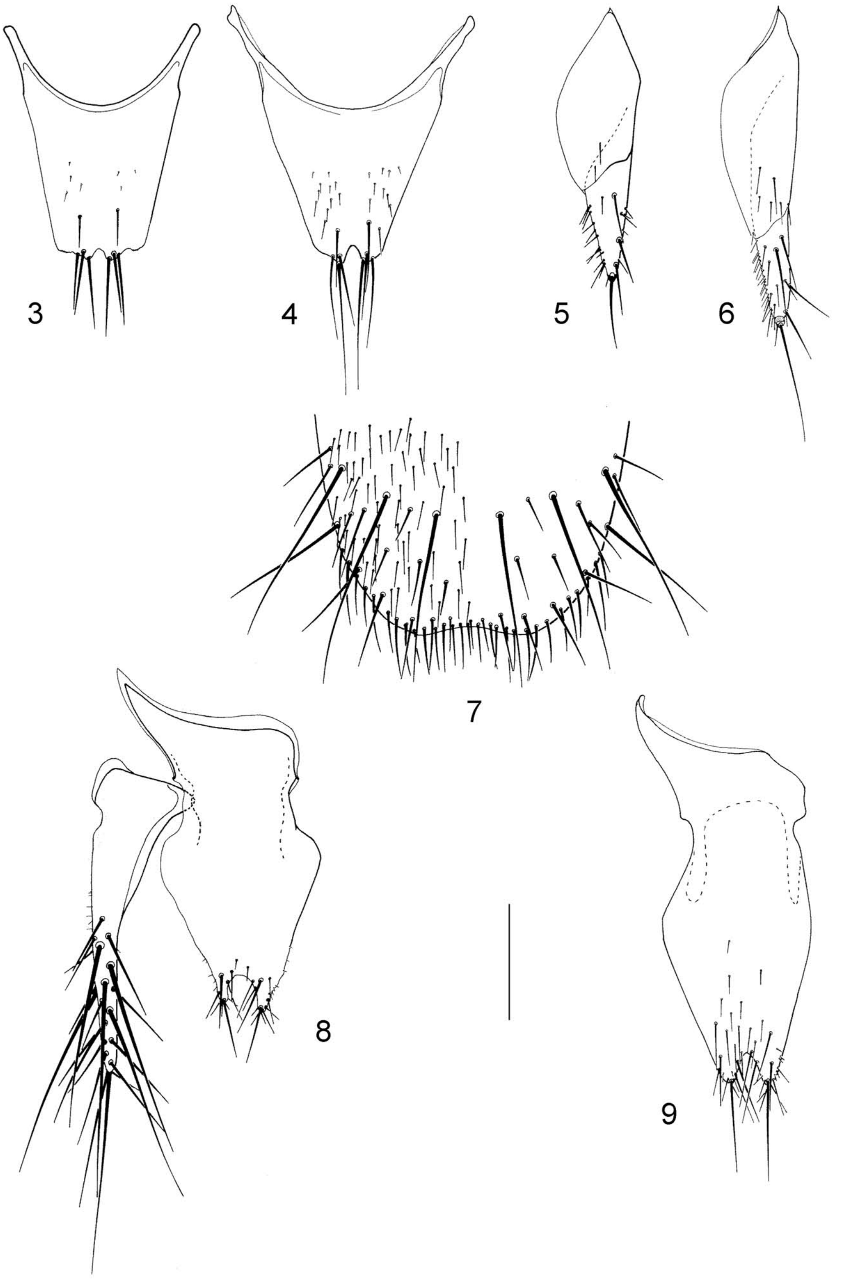
(Figs 2, 4, 6, 9)

Type material. **Holotype**, ♂: "E-NEPAL 6.–10.7.2000, Kangchenjunga Himal Mts, GHUNSA viii. 3375m, 27. 40N 87. 56E (GPS) env., David Král lgt. NEPAL, Expedition Jan Farkač, David Král and Jan Schneider, 2000" (CHP); **paratypes** (7 spec.): 1 ♂, 1 ♀: "Nepal centr. Sauraha, 20.–25.5.1992, leg. I. Jeniš" (NMW); 2 ♀♀: "NEPAL c. Prov. Narayani, Sauraha, Rapti River, 27°34'51"N 84°29'30"E, 14.–15.07.2001, LF, 180m, riverside, leg. A. Kopetz" (NME); 1 ♂, 1 ♀: "NE-INDIA: Assam, 100 m, Kaziranga wild life, Pan Bari res. For., 12.–21.XI.1997, 26°45'N 93°10'E, Siniaev V., S. & M. Murzin" (CSB, NMW), 1 ♂: almost identical label data as previous (CSB).

Description. 7.0–11.5 mm long (4.0–5.4 mm, abdomen excluded). Head including neck black, clypeus along anterior margin and antennal sockets very narrowly reddish yellow; labrum and mandibles brownish yellow, tips of mandibles darker brown; palpi yellowish, last palpomeres becoming darker brwonish distally; antennae reddish yellow with segments 4–9 to variable extent dark brown to blackish; pronotum dark to piceous, anterior margin very narrowly yellowish medially, anterior angles extensively triangularly yellow; elytra black, lateral (deflexed) and posterior margin brightly yellow, yellow portion markedly wider at posterior angles; along suture with variably broad, oval, dark orange-red spot, anteriad reaching slightly beyond posterior angle of scutellum; abdominal segments piceous to black, slightly iridescent, posterior margins of first four visible tergites narrowly but sharply reddish, posterior margins of tergites VII and VIII less sharply and more broadly obscurely yellowish brown; legs amber to reddish yellow.



Figs 1, 2. *Mentophilonthus* Levasseur; Aedeagus of 1) *M. notabilis* (Kraatz), 2) *M. davidkrali* sp. nov.; a) aedeagus, ventral view, b) semilateral view of parameral branch, c) entire paramere. – Scale bar represents 0.4 mm (a), 0.2 mm (b, c).



Figs 3–9. *Mentophilonthus* Levasseur; female tergite X of 3) *M. notabilis* (Kraatz), 4) *M. davidkrali* sp. nov.; gonocoxites of female genital segment of 5) *M. notabilis*, 6) *M. davidkrali*; 7) male sternite VIII of *M. notabilis*; 8) male sternite IX and tergite IX of *M. notabilis*; 9) male sternite IX of *M. davidkrali*. – Scale bar represents 0.4 mm.

Head suborbicular to slightly subrectangularly transverse (large males), 1.16–1.25 as wide as long; eyes occupying almost entire lateral length of head, 3.33–5.14 as long as very short tempora; in addition to usual postocular macro-setae, with a row of short and stout setae along postero-ventral margin of eye, the grooves of which forming an indistinct temporal carina; medial interocular punctures exceedingly widely separated, situated slightly in front of lateral interocular punctures; surface of head impuctate, with fine but very dense microsculpture of transverse and oblique waves.

Antennae moderately long, bent backward almost reaching hind angle of pronotum; antennomere 2 slightly longer than antennomere 3, length of remaining antennomeres slightly variable, usually antennomere 4 inconspicuously oblong, antennomeres 5 and 6 about as long as wide, remaining antennomeres inconspicuously wider than long, antennomere 11 as long as or slightly longer than antennomere 4.

Pronotum about as long as wide or slightly wider than long (L/W = 0.96–1.01), sides subparallel in basal half, slightly narrowed toward anterior margin; posterior angles weakly marked, rounded, base of pronotum regularly convex; dorsal rows each with two punctures (puncture at anterior margin not counted, because it is missing in most specimens at least on one side), occasionally one puncture missing; with one large sublateral puncture of same size as punctures of dorsal rows, situated halfway between dorsal rows and lateral margin and (lengthwise) between punctures of dorsal rows; microsculpture similar to that on head.

Scutellum moderately densely, exceedingly finely punctate, punctures distinctly smaller than those on elytra; wavy microsculpture much finer than on head and pronotum.

Elytra along sides about as long as wide, slightly widened posteriad, at base only slightly wider than pronotum; very finely and densely punctate, size of punctures slightly smaller than one eye facet, separated by about one puncture diameter in transverse direction; pubescence greyish to golden (depending on angle of view and light); in addition, with a longitudinal row of 4–6 larger punctures on disc about half way between suture and lateral margin. Due to the dense general punctation, these punctures are not as easily discernible as in *M. notabilis*.

Abdomen with first four visible tergites with two basal lines, elevated area between basal lines impunctate; remaining surface of tergites exceedingly finely and rather sparingly punctate, finer and much less dense than on elytra, pubescence of same color as on elytra.

Male. First three protarsomeres strongly dilated, subbilobed, protarsomere 4 much less strongly dilated, triangular; first four tarsomeres bearing modified pale setae ventrally; sternite VIII hardly differing from that of *M. notabilis* (Fig. 7); sternite IX with highly asymmetrical basal portion, apex slightly emarginate, each lobe bearing one moderately long macro-seta (Fig. 9; *M. notabilis*: Fig. 8); aedeagus (Fig. 2a) with huge phallobasis occupying about half length of median lobe, apical portion of median lobe lightly sinuately narrowed toward rather roundly pointed apex; paramere (Figs 2b, c) deeply bilobed, each lobe bearing about 14–16 irregularly arranged peg setae along oblique truncate apical margin; aedeagus and paramere of *M. notabilis*: Figs 1a, b.

Female. First three protarsomeres much less distinctly dilated than in male, protarsomere 4 small, only first three protarsomeres bearing modified pale setae ventrally; gonocoxites of female genital segment (Fig. 6) larger than in M. notabilis (Fig. 5), medial margin of second gonocoxite with denser and finer setation; tergite X (Fig. 4) with more distinct medio-apical emargination than in *M. notabilis* (Fig. 3) and with somewhat longer terminal setation.

Differential diagnosis. The new species is very similar to *M. notabilis* but differs, in addition to the different aedeagus, by the slightly longer antennomerrs, the broader pronotum with yellow anterior angles, the much denser punctation of the elytra, and the finer and less dense punctation of the abdominal tergites. Another noteworthy fact is that the male protarsomere 4 of *M. notabilis* is lacking the pale modified setae.

Distribution. The species is at present known from Central and East Nepal, and from north-eastern India.

Bionomics. Except for the holotype (3375 m a.s.l., in a mixed *Abies-Quercus-Rhododendron* forest) all specimens have been collected at elevations below 200 m a.s.l. (partly together with *M. notabilis*) in a riparian-like habitat or at light. It might be quite likely that the holotype specimen has been carried up the mountains by a strong wind current.

Etymology. The new species is named in honor of Dr David Král, a specialist in Scarabaeoidea, who collected the holotype.

Acknowledgements

In addition to the persons mentioned in the Abbreviation section, the authors are grateful to Dr David Král (Charles University in Prague) who presented the holotype to the senior author.

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Two new species of *Laemostenus* (*Antisphodrus*) (Coleoptera: Carabiade) from Turkey and Syria

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Abstract. Two new species of the genus *Laemostenus* Bonelli, 1810, subgenus *Antisphodrus* Schaufuss, 1865 are described, illustrated and compared with the related species: *Laemostenus* (*Antisphodrus*) *puchneri* sp. nov. of the *L.* (*A.*) *bodemeyeri* Ganglbauer, 1909 species-group and *Laemostenus* (*Antisphodrus*) *nusayriyahensis* sp. nov. of the small cave dwelling *L.* (*A.*) *cavazzutii* Casale, 1983 species-group. Some faunistic and systematic comments on the *L.* (*A.*) *glasunowi* species-group are given. Identification keys for the Turkish species of the *L.* (*A.*) *bodemeyeri* species-group, as well as the *L.* (*A.*) *cavazzutii* and *L.* (*A.*) *glasunowi* species-groups are provided, check lists for all three species-groups are given.

Taxonomy, descriptions, new species, distribution, Coleoptera, Carabidae, *Laemostenus*, *Antisphodrus*, Palearctic region

INTRODUCTION

The subgenus *Antisphodrus* Schaufuss, 1865 of the genus *Laemostenus* Bonelli, 1810 includes about 55 species with a circum-mediterranean distribution (Casale 1988, Casale & Vigna Taglianti 1999, Casale 2003). Most of them are known to be depigmented, with a subterranean way of life, frequently cavernicolous (Casale 1988, 1997, Casale et al. 2003, Jeanne 1996, Lassalle 1997).

Twenty-two species of this subgenus have been reported from Turkey so far (Casale & Vigna Taglianti 1999, Casale et al. 2003, Lohaj 2004).

In the course of study of the Turkish material of the genus *Laemostenus*, collected by Alfred Puchner in the spring 2000, one male belonging to an undescribed species of the *L.* (*A.*) *bodemeyeri* species-group has been discovered. This material has been made available for the study by Walter Heinz (Schwanfeld, Germany). Another material of *Laemostenus* has been delivered by Milan Řezáč (Charles University in Prague, Czech Republic), Czech specialist on spiders, and has been collected during his expedition to Syria. This material contained one new species belonging to the small, specialised cave dwelling species-group *L.* (*A.*) *cavazzutii* and it is a first representative of subgenus *Antisphodrus* from teritory of Syria.

MATERIAL AND METHODS

Taxonomy of species-groups of the subgenus *Antisphodrus* used here is that of Casale (1988).

Abbreviations used in the text: CEH – collection of Evžen Hajdaj, Ježov, Czech Republic; CRL – collection of Roman Lohaj, Košice, Slovakia; CWH – collection of Walter Heinz, Schwanfeld, Germany.

TAXONOMY

***Laemostenus* (*Antisphodrus*) *puchneri* sp. nov.**

(Figs 1, 4–7)

Type material. Holotype, male, labelled: "Turkei, s.c. Anatolien, Murtici, umg.Gözelsu, Gulendag, 1050 m, A. Puchner, 16. IV.– 7.V.2000", deposited in CWH.

Description of holotype. Total body length (from apex of mandibles to apex of elytra) 14.7 mm. Colour piceous-brown, antennae and tarsi reddish-brown. Head and pronotum smooth, shiny, elytra glabrous, dull, with distinct microsculpture (Fig. 1).

Head. Large, robust, almost as long as wide and as long as pronotum, shiny, smooth, with two supraorbital setiferous punctures on each side and 11 additional occipital setae. Frontal furrows shallow, smooth, reaching to level of anterior edge of eyes. Eyes small, reduced. Clypeus with four (two on each side) long setae. Mandibles long, narrow. Antennae long and slender, reaching almost half of elytral length, from antennomere V flattened. Antennomere III with accesory setation consisting of 9–11 long, protruding setae. Antennomere IV–XI with dense, decumbent pubescence.

Pronotum. Slightly longer than wide, ratio maximum width / maximum length = 0.9, shiny, smooth, with very fine transversal rugae. Anterior angles prominent, rounded at apex. Sides sinuated before base, posterior angles obtuse, with one setiferous puncture. Base slightly oblique towards posterior angles, with two shallow, smooth basal impressions. Lateral furrow narrow, with one setiferous puncture in apical third.

Elytra. Oval, expanded posteriorly, with maximal width at its apical third, flattened, dull, with isodiametric microsculpture. Base almost as wide as the base of pronotum. Basal bead strongly concave, humeri distinct. Striae very fine, punctate, intervals flat. Scutellar stria and scutellar setiferous punctures present. Series umbilicata consists of 18–19 setae. Mesosternum denticulate before mesocoxae. Abdominal sternites smooth, dull, with fine, dense microsculpture, sternites IV–VI with two setae on distal margin, without accessory ones.

Legs. Elongate, slender, mesotibiae straight. Protibiae with fine, sparse pubescence limited to internal sides of apical portions. Pubescence of metatibiae dense, limited to the apical half. Tarsi with fine, sparse, decumbent pubescence. Claws smooth, without denticulation.

Genitalia. Aedeagus (Figs 4–7) with median lobe short, arcuate, inflated at its basal third, apex short, subtruncate, slightly prominent dorsaly. Right paramere rounded apically, left paramere with short apical membranous lobe. Female unknown.

Distribution. So far known only from the type locality.

Collection circumstances. Holotype was collected by pitfall traps exposed for *Carabus* sp. during three weeks.

Etymology. Patronymic, dedicated to Alfred Puchner (Oberdanegg, Austria), the collector of the new species.

Discussion. According to the last revision of the genus *Laemostenus* (Casale 1988) and the following studies (Casale 1998, Casale & Vigna Taglianti 1999, Casale et al. 2003, Lohaj 2004), the new species belongs to the *L.* (*A.*) *bodemeyeri* species-group (sensu Casale 1988). The group is occurring through Greece (south Peloponnesos and the Island of Kalymnos), the Anatolian mountain range Taurus (Toros Dağlari) to Lebanon (Djebel Sannin) and includes 15 species (2 species from Greece, 12 species from Turkey and one species from Lebanon). Representatives of this species-group are characterised by more or less depigmented body, often strongly flattened, partially reduced, but still functioned eyes and long and slender legs and antennae, which suppose started but unfinished stage to subterranean adaptation.

Laemostenus (*Antisphodrus*) *puchneri* sp. nov. is most closely similar to *L.* (*A.*) *cyrili* and *L.* (*A.*) *lundbergi*. All three species, which are spread on the relatively small teritory of Taurus mountains (about 100 km), are characterised by additional setation on antennomere III, consisting of 9–20 long, protruding setae and nu0merous additional occipital setae. The main difference of the new species from *L.* (*A.*) *cyrili* and *L.* (*A.*) *lundbergi* is the presence of four setae on clypeus, while these two species possess only two clypeal setae. *Laemostenus* (*Antisphodrus*) *puchneri* sp. nov. can be easily separated from the other species of *L.* (*A.*) *bodemeyeri* species group described from Turkey so far as follows:

Key to the identification of Turkish species of *Laemostenus* (*Antisphodrus*) *bodemeyeri* species-group

1(6) Antennomere III without accessory setae except apical fixed ones.
2(3) Elytra strongly convex, especially at its posterior third, legs more robust. Eastern Taurus: Bolkar dağlari. .... *L.* (*A.*) *bodemeyeri* Ganglbauer
3(2) Elytra more flattened, legs long and slender.
4(5) Head and pronotum remarkably elongate, narrow and paralellsided. Pronotum distinctly longer than wide, eyes reduced, but prominent. Antennae reaching half of elytra. Eastern Taurus: environs of Mersin. .... *L.* (*A.*) *zoiai* Casale et Vigna Taglianti
5(4) Head and pronotum broader, pronotum almost as long as wide, eyes reduced, but not strongly prominent. Antennae very long, reaching apical third or fourth of elytra. Western Taurus: environs of Akseki and Antalya. .... *L.* (*A.*) *longicornis* Casale, 1988
6(1) Antennomere III with accesory setation consisting of 1–7 very short, or numerous (9–20) long, protruding setae.
7(14) Antennomere III with 9–20 long, protruding setae.
8(9) Head with two supraorbital setiferous punctures, without additional occipital ones. .... *L.* (*A.*) *agnolettii* Vigna Taglianti
9(8) Head with additional occipital setae.
10(11) Clypeus with four setae. .... *L.* (*A.*) *puchneri* sp. nov.
11(10) Clypeus with two setae.
12(13) Smaller species, 14–16 mm, more slender, elytrae narrower, with maximum width in the middle, basal bead of elytra strongly concave. .... *L.* (*A.*) *cyrili* Lassalle, 1997
13(12) Larger, 14–18 mm, more robust, elytrae broader, with maximum width in apical third, basal bead of elytra slightly concave. .... *L.* (*A.*) *lundbergi* (Jeanne)
14(7) Antennomere III with accesory setation consisting of 1–7 very short setae.
15(16) Colour dark brown, elytra strongly flattened, striae very fine, smooth. Larger species, 14–17.5 mm. .... *L.* (*A.*) *catlosi* Lohaj
16(15) Colour fully redish to redish-brown, elytra more convex, striae deep. Smaller species, 11.5–15.6 mm.
17(18) Small species, 11.9 mm, collor fully reddish-brown, aedeagus markedly constricted to the apex. .... *L.* (*A.*) *gasparoi* Casale
18(17) Larger species, 12–15.6 mm, aedeagus with short, subtruncate apex.
19(20) Protibiae without accesory pubescence on internal sides of apical portions, 11.5–13 mm. Eastern Taurus Mts: caves and pits near Mersin. .... *L.* (*A.*) *guzelolukensis* Lassalle
20(19) Protibiae with with fine, sparse pubescence. 12–15.6 mm. Western Taurus: surrounding of Antalya and Burdur.
21(22) Smaller species (12–14.4 mm), with narrower and more elongate head, elytra shorter, more depressed. .... *L.* (*A.*) *kestelensis* Casale, Felix et Muilwijk
22(21) Larger species (13–15.6 mm), elytra more elongated, strongly convex. ...... *L.* (*A.*) *patrizii* Vigna Taglianti

Annotated catalogue of *Laemostenus* (*Antisphodrus*) *bodemeyeri* species-group

1. *L.* (*A.*) *agnolettii* Vigna Taglianti, 1999: 334; Turkey, Konya, Seydişehir, Ferzen (Kuğlu) mağara cave (type locality)
2. *L.* (*A.*) *beroni* Casale, 1988: 924: Greece, Island of Kalymnos, Cave of Seven virgins (type locality), cave de Skalia.
3. *L.* (*A.*) *bodemeyeri* Ganglbauer, 1900: 134; Turkey, Taurus, Bolkar dağlari [= Bulghar Dagh by the earlier authors], Bolkar Mağara cave (type locality).
4. *L.* (*A.*) *casalei* Dubault et Lassalle, 1991: 87; Greece, Peloponnesos, mountain range Taygétos (type locality).
5. *L.* (*A.*) *catlosi* Lohaj, 2004: 113; Turkey, Taurus, Akseki, Bademli pass (type locality), surrounding of Yarpuz.

6. *L.* (*A.*) *cyrili* Lassalle, 1997: 7; Turkey, Konya, south of Beyşehir lake (type locality), Konya, Yesildağ.
7. *L.* (*A.*) *gasparoi* Casale, 2003: 238; Turkey, western Taurus, Akyarlar mağara-cave, near road Antalya–Kemer (type locality).
8. *L.* (*A.*) *guzelolukensis* Lassalle, 1997: 7; Turkey, Eastern Taurus, Mersin, caves and pits near Güzeloluk (type locality), Mersin, Silifke, Cennet mağarasi caves, Astim mağarasi caves, Cennet Cögükü mağara (cave).
9. *L.* (*A.*) *kestelensis* Casale, Felix et Muilwijk, 2003: 235; Turkey, Buçak, Burdur, Yarasa mağara cave (type locality), Sefer Yitiği mağara cave.
10. *L.* (*A.*) *libanensis* (La Brulerie, 1875: 421) (described as S*phodrus*); Lebanon, Djebel Sannin (type locality).
11. *L.* (*A.*) *longicornis* Casale, 1988: 608; Turkey, Western Taurus, Akseki-Imrasan Geçidi (pass) – unknown cave (type locality), Akseki cave of Demirci Dükkanlan, Akseki, pit near Dikmen, 900 m, Gülendağ, North of Manavgat (Antalya).
12. *L.* (*A.*) *lundbergi* (Jeanne, 1996: 107) (*Antisphodrus*); Turkey, Western Taurus, Antalya, Yarpuz, 1200 m (type locality), Imrasan geçidi (Lassalle 1997).
13. *L.* (*A.*) *patrizii* Vigna Taglianti, 1999: 327; Turkey, Western Taurus, Antalya, Dosemealti, Yağça, Mustan Ini (type locality), unknown caves – mountain range In Dagh, Yeniköy, Karain magarasi, Koca in mağara – mountain range In Dağ (ca 45 km North of Antalya) (Lohaj 2004).
14. *L.* (*A.*) *puchneri* sp. nov.; Turkey, Antalya, Mürtici, Gülendağ (type locality).
15. *L.* (*A.*) *zoiai* Casale & Vigna Taglianti, 1999: 332; Turkey, Eastern Taurus, Mersin, Anamur, Kösen Bürkü mağara cave (type locality), Antalya – Gazipasa, Yalan Dunya mağara (cave), (Eric Ollivier lgt., unpublished data).

***Laemostenus* (*Antisphodrus*) *nusayriyahensis* sp. nov.**

(Figs 2, 8)

Type material. Holotype female, five last left antennomeres and last right antennomera missing, labelled: “NW Syria, Homs, cave between Mashtal Helu and Uyounl Wadi, 600 m a.s.l., Mts Jebel Ansaria, 31.3.2001, M.Řezáč lgt.“, deposited in CRL.

Description. Total body length (from the apex of mandibles to apex of elytra) 11.4 mm, colour pale redish-brown, depigmented, antennae and legs paler. Head and pronotum smooth, shiny, elytra strongly flattened, glabrous, dull, with distinct isodiametric microsculpture (Fig. 2).

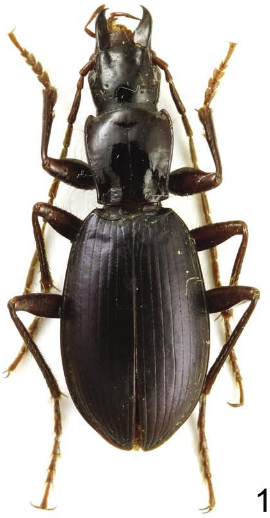
Head. Medium-sized, almost as long as wide, slightly narrower than pronotum, shiny, smooth, with two supraorbital setiferous punctures on each side, without additional occipital ones. Frontal furrows scarcely visible, very fine, shallow, smooth. Eyes strongly reduced, not prominent, limited to a paler spot with darker centre. Clypeus with two long setae. Mandibles long, narrow. Antennae long and slender, reaching almost half of elytral length. Antennomere III with accesory setation consisting of 2–3 short setae. Antennae with dense, decumbent pubescence from antennomere IV, from antennomere V strongly flattened.

Pronotum. Narrower, almost as long as wide, index maximum length/maximum width = 1, shiny, smooth. Sides of pronotum strongly sinuated before base, posterior angles acute, with one setiferous puncture. Anterior angles prominent, rounded at apex. Base of pronotum slightly oblique towards the posterior angles, with two deep, smooth basal impressions reaching middle of pronotal length. Lateral furrow distinct, narrow, with one setiferous puncture in its apical third.

Elytra. Oblong, almost parallel sided, with maximum width at its middle part, strongly flattened, dull, with evident isodiametric microsculpture. Base of elytra distinctly wider than base of pronotum. Basal bead concave, humeri rounded. Elytral striae distinct, but fine, punctate, intervals flat. Scutellar striae and scutellar setiferous punctures present. Series umbilicata consists of 15–16 setae. Mesosternum unarmed, without teeth before mesocoxae. Abdominal sternites smooth, dull, with fine, dense microsculpture, sternites IV–IV with two setae on the distal margin, without accessory ones.

Legs. Very long, slender, mesotibiae straight. Protibiae without accesory pubescence on the internal sides of apical portions. Pubescence of metatibiae dense, limited to apical half. Tarsi with fine, sparse, decumbent pubescence; tarsal claws smooth, without traces of denticulation.

Genitalia. Female stylomeres as on Fig. 8. Male unknown.



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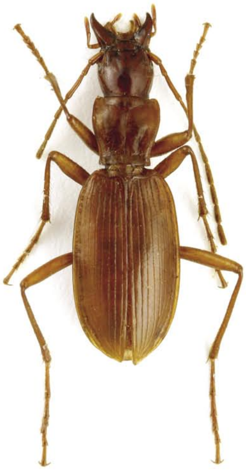

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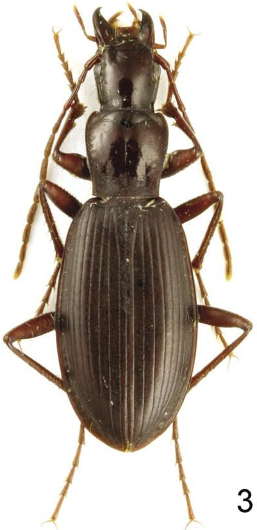

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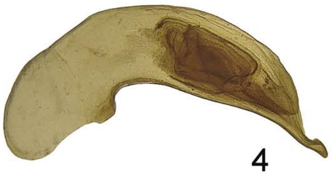

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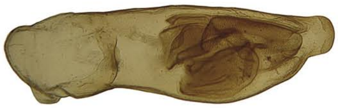

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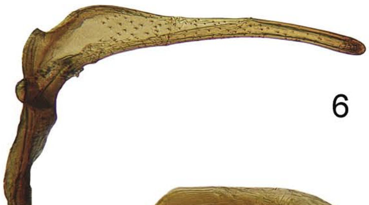

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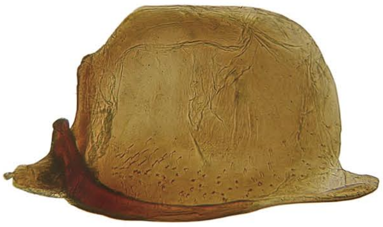

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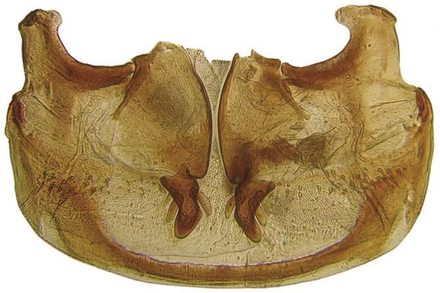

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Figs 1–8. 1 – *Laemostenus* (*Antisphodrus*) *puchneri* sp. nov., holotype, 2 – *Laemostenus* (*Antisphodrus*) *nusayriyahensis* sp. nov., holotype, 3 – *Laemostenus* (*Antisphodrus*) *glasunowi* Semenov, 1895, female, Iran, Hasan Keif, 4 – *Laemostenus* (*Antisphodrus*) *puchneri* sp. nov., aedeagus – median lobe, left side*, 5* – *Laemostenus* (*Antisphodrus*) *puchneri* sp. nov., aedeagus – median lobe, dorsal side, 6 – *Laemostenus* (*Antisphodrus*) *puchneri* sp. nov., aedeagus – right paramera, 7 – *Laemostenus* (*Antisphodrus*) *puchneri* sp. nov., aedeagus – left paramera*,* 8 – *Laemostenus* (*Antisphodrus*) *nusayriyahensis* sp. nov.. ovipositor, ventral view.

Distribution. NW Syria, cave between Mashtal Helu and Uyun al Vadi (ca. 60 km W of Homs), southern part of the mountain range Jabal an Nusayriyah, original name in arabic language (= Jebel Ansaria, Ansaryia, probably european transcription of vernacular name).

Collection circumstances. Type locality – nameless cave, situated in 600 m a.s.l., is about 100 m long; it was relatively wet in time of visit (end of March). Type specimen was collected under stone in the entrance, together with troglobiont spider genus *Harpactea* (Araneae: Dysderidae).

Etymology. Topotypic, referring to the Jabal an Nusayriyah mountains, type locality of this remarkable species.

Discussion. *Laemostenus* (*Antisphodrus*) *nusayriyahensis* sp. nov. belongs to the small, eucavernicolous species-group of *Laemostenus* (*Antisphodrus*) *cavazzutii* (sensu Casale 1988). This homogenous group is primarily characterised by depigmented, flattened, slender and elongate body, very long and slender legs, unarmed mesosternum and smooth tarsal claws. Two species from eastern Turkey have been described in the group: *L.* (*A.*) *cavazzutii* from the cave near Imranli (Sivas) and *L.* (*A.*) *kurdicus* from the cave about 30 km North of Göksun (Casale 1988). *Laemostenus* (*A.*) *libanensis* has been described from Lebanon, mountain range Djebel Sannin, and currently is placed to the *L.* (*A.*) *bodemeyeri* species-group. Last species has been described on remains (Casale 1988, Lohaj 2004) and its correct systematic position still needs to be verified. *Laemostenus* (*A.*) *libanensis* differs from all species of *L.* (*A.*) *cavazzutii* species-group by the presence of mesosternal teeth. *Laemostenus* (*A.*) *nusayriyahensis* sp. nov. can be easily separated from another two Turkish species as follows:

Key to the identification of *Laemostenus* (*Antisphodrus*) *cavazzutii* species-group

1(2) Antennomere III with accesory setation consisting of two-three very short setae, eyes strongly reduced, not prominent. 11.4 mm long. Syria: Jabal an Nusayriyah mountains. .... *L.* (*A.*) *nusayriyahensis* sp. nov.
2(1) Antennomere III without accessory setae except apical fixed ones, eyes reduced, but prominent. 10–16 mm long. Eastern Turkey (Göksun, Sivas).
3(4) Larger species (12.5–16 mm), shiny, with narrow pronotum. Turkey: Sivas. .... *L.* (*A.*) *cavazzutii* Casale, 1983
4(3) Smaller species (10–12.5 mm), matt, with distinct microsculpture, pronotum wider, transverse. Turkey: Göksun. .... *L.* (*A.*) *kurdicus* Casale, 1988

Annotated catalogue of *Laemostenus* (subg. *Antisphodrus*) *cavazzutii* species-group

1. *L.* (*A.*) *cavazzutii* Casale, 1983: 258; Turkey, Sivas, Imranli, nameless cave (type locality).
2. *L.* (*A.*) *kurdicus* Casale, 1988: 628: Turkey, small nameless cave about 30 km North of Göksun (type locality).
3. *L.* (*A.*) *nusayriyahensis* sp. nov.; Syria, mountain range Jabal an Nusayriyah, nameless cave between Mashta Helu and Uyun al Vadi (ca 60 km W of Homs) (type locality).

Notes on *Laemostenus* (*Antisphodrus*) *glasunowi* species-group

Laemostenus (*Antisphodrus*) *glasunowi* Semenov, 1895

(Fig. 3)

Material examinated. Two females labelled as follows: "N Iran p. Mazandaran, 10 km S Hasan Keif, 2300 m, 3625N 5102E, 17.VI.2000, lgt. Hajdaj E. P.", R. Lohaj det. (CEH, CRL).

Remarks. Specimens were collected in the alpine zone in about 2300 m a.s.l. under large stones near thawing snow together with *Carabus* (*Mimocarabus*) *elburzensis* Breuning 1946, *Carabus* (*Sphodristocarabus*) *adamsi persa* Lapouge 1925, *Nebria nigerrima* Chaudoir 1846, *Stomis hyrcanus* Tschitschérine, 1904, *Platyderus davatchii* Morvan 1970, *Laemostenus* (*Pristonychus*) *elytrolargus* Morvan 1981, etc. (Coleoptera, Carabidae). Village Hasan Keif is near the villages

Kalardasht and Rudbarak (J. Procházka, pers. comm.). One female of *L.* (*Antisphodrus*) *glasunowi* was recorded also from this locality (Dvořák 1982: 279). Two examined females are 14.5 and 14.9 mm long, morphological characters agree with those presented in Casale (1988: 620–623). Both two specimens have reduced, but evident mesosternal teeth before mesocoxae.

Laemostenus (*Antisphodrus*) *bulirschi* Dvořák, 1995

Material examined. Paratype, male, labelled: “Turc. c. m., 1–3.7.1993, Ala daglari 1700 m, Demirkazik env., Bulirsch & Resl lgt.” (CRL).

Laemostenus (*Antisphodrus*) *hroni* Dvořák, 1998

Material examined. Paratype, female, labelled: “Turcia c., Pozanti env., 26.IV.–6.V.1995, F. Moravec & J. Hron lgt.” (Collection Vladimír Skoupý, Žilina, Czech Republic).

Laemostenus (*Antisphodrus*) *deconincki* Casale et Quéinnec, 2001

Material examined. Paratype, female, labelled: Iran, Grotte de Gama Siab, Zagros – Kuh e Garrin, VIII–IX 1996, P. de Coninck (CRL).

According to the last revision of the genus *Laemostenus* (Casale 1988), *L.* (*A.*) *glasunowi* species-group includes three species: *L. glasunowi* Semenov, 1895, *L. mirzayani* (Morvan, 1973) and *L. iranicus* (Dvořák, 1982). During years 1995–2004, another five species, currently placed to this group have been described (Casale 1997, Casale et Quéinnec 2001, Dvořák 1995, 1998, Morvan 2004). All, so far known species can be easily separated by the following key for identification:

Key to the identification of *Laemostenus* (*Antisphodrus*) *glasunowi* species-group

1(10) Mesosternum with teeth before mesocoxae.
2(3) Protibiae with fine, sparse setation limited to the internal sides of apical portions. 12.2–15 mm. Turkey. .... *L.* (*A.*) *bulirschi* Dvořák, 1995
3(2) Protibiae without accesory setation. Iran: Zagros and Elborz mountain ranges.
4(5) Eyes large, not reduced, long almost as tempora. Pronotum subquadrate, slightly sinuated toward hind angles. 13–14.5 mm. Zagros. .... *L.* (*A.*) *mirzayani* (Morvan, 1973)
5(4) Eyes smaller, reduced, long about as half of tempora, pronotum subcordiforme.
6(7) Base of elytra broad, distinctly wider than base of pronotum, elytral striae with very fine punctation. 11.5 mm. Zagros. .... *L.* (*A.*) *iranicus* (Dvořák, 1982)
7(6) Base of elytra almost as wide as base of pronotum. 12–15.5 mm. Elborz
8(9) Elytra broader and more convex, elytral striae with fine punctation. 13.5–15 mm. .... *L.* (*A.*) *sulaimanensis* (Morvan, 2004)
9(8) Elytra more slender and flattened, elytral striae with distinct punctation. 12–15.5 mm. .... *L.* (*A.*) *glasunowi* Semenov, 1895
10(1) Mesosternum unarmed, without teeth before mesocoxae.
11(14) Colour reddish-testaceous, or depigmented, slight species with narrow, cordiforme pronotum.
12(13) Larger, 15–18 mm, very slight (4.8–5.6 mm) and more convex species. Iran, Zagros. .... *L.* (*A.*) *deconincki* Casale et Quéinnec, 2001
13(12) Smaller, 13.5 mm, testaceous, depigmented, strongly flattened species. Turkey. .... *L.* (*A.*) *baehri* Casale, 1997
14(11) Colour piceous brown, species with wider elytra, maximum width in apical third, index maximum length/maximum width of elytra = 1.5. 14–15 mm. Turkey. .... *L.* (*A.*) *hroni* Dvořák, 1998

Annotated list of *Laemostenus* (*Antisphodrus*) *glasunowi* species-group

1. *L.* (*A.*) *baehri* Casale, 1997: 280; holotype locality label is „Taurus armen.“. According to Casale et Vigna Taglianti (1999, p.401), the type locality could me more correctly identified as Eastern Taurus – Bolkar dağlari (= Bulghar dagh, Cilician Toros of the earlier authors).
2. *L.* (*A.*) *bulirschi* Dvořák, 1995: 417: Turkey, Aladağlari, Demirkazik env. (type locality).*glasunowi* Semenov, 1895: 193: Iran, Elburz, Demavend, cave „Karr“ near Ask (type locality), mountain ranges Kuh-I-Kahar and Taht-El-Suleiman (Casale 1988), Kalardasht-Rudbarak (Dvořák 1982).
3. *L.* (*A.*) *deconincki* Casale et Quéinnec, 2001: 178: Iran, Zagros, Kuh-e-Garrin, Navahan, Gamasiab cave (type locality).
4. *L.* (*A.*) *glasunowi* Semenov, 1895: 193: Iran, Elburz, Demavend, cave „Karr“ near Ask (type locality), mountain ranges Kuh-I-Kahar and Taht-El-Suleiman (Casale 1988), Kalardasht-Rudbarak (Dvořák, 1982).
5. *L.* (*A.*) *hroni* Dvořák, 1998: 169: Turkey, Taurus – Bolkar dağlari, Pozanti env. (type locality)
6. *L.* (*A.*) *iranicus* (Dvořák, 1982): 279 (*Antisphodrus*): Iran, Zagros, Kuhé Dena, 2000–3000 m (type locality).
7. *L.* (*A.*) *mirzayani* (Morvan, 1973): 184 (*Antisphodrus*): Iran, Zagros, Zardeh-Kuh Kurang, 3800 m (type locality).
8. *L.* (*A.*).*sulaimanensis* (Morvan, 2004): 31 (*Antisphodrus*): Iran, Elburz, Mt. Sulaiman, 3700 m (type locality).

NOTE: According to the original description and drawings, this species is probably identical with *L.* (*A.*) *glasunowi*, which was also reported (Casale, 1988: 623, see also above) from Sulaiman mountain (Kuh-e Tacht-e Soleiman, english transcription of vernacular name).

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New fossil record Gerridae (Heteroptera: Gerromorpha) from the Early Oligocene diatomite in the Czech Republic

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Abstract. New record of aquatic water striders (Heteroptera: Gerromorpha) is reported from the laminated beds of lacustrine diatomite in Holý Kluk hill site near Proboštov from Early Oligocene of České středohoří Mts (Czech Republic). Furthermore, the present occurrence is significant for palaeoecology. It represents an important element for reconstruction of aquatic insect palaeocommunities.

Taxonomy, fossil, Gerromorpha, Gerridae, lacustrine sediments, palaeoecology, Tertiary, Early Oligocene, Czech Republic

INTRODUCTION

Gerromorpha comprises 145 genera with about 1600 extant species worldwide classified in eight families, commonly called semiaquatic bugs (Andersen 1995). Most of them live on surface film of freshwater or in the near surroundings of aquatic or humid terrestrial habitats (Andersen 1982). Family Halobatidae is also well known by insects inhabiting seashore tidal zone counting more than 100 species (Andersen 1995). Fossil record of Gerromorpha is rather poor comprising so far six families of mostly Cenozoic and several Mesozoic taxa recently reviewed (see Andersen 1998, and complete list of fossil Gerromorpha listed by Wappler & Andersen 2004).

Only few fossil gerrid species have been described, viz. in the north-eastern Italian Eocene (Andersen et al. 1994), the Late Eocene Baltic amber (Andersen 2000, Weitschat et al. 2002), the Eocene and Oligocene-Miocene of North America and Paleocene-Eocene of Denmark (Andersen 1982), and in the Miocene Dominican amber (Andersen & Poinar 1992, Andersen 2001). The oldest accurate records of the family are the two genera *Palaeogerris* Andersen, 1998 (Paleocene-Eocene boundary, Fur and Ølst formations, Denmark) (Andersen 1998), and *Cretogerris albianus* Perrichot, Nel et Néraudeau, 2005 from the late Albian (early Cretaceous) of France (Perrichot et al. 2005), suggesting that their sister group, the Veliidae evolved even more than 120 Ma ago (Wappler & Andersen 2004). Several Cenozoic lacustrine outcrops have never furnished any Gerridae (viz. the very rich insect layers of the Paleocene of Menat (Puy-de-Dôme, France) late Eocene of Alès-Monteils (Gard, France) or of the Oligocene of Bes-Konak (Turkey), or Céreste (France). The absences of these semi-aquatic bugs in several paleolakes are very surprising. These insects are not dependent on the quality of the water for breath and food as they live at the surface water and eat insects and small animals that are falling in the water. Possibly, their rarity is related to the fact that they live and die at the water surface, so that their dead bodies rarely reach the bottom of the water body where they could be fossilized in the sediment (Wappler & Andersen 2004).

The Early Oligocene locality Holý Kluk hill site near Proboštov in the České středohoří Mts belongs lithostratigraphically to the Ústí Formation (Radoň et al. 2006). The site represented by palaeoenvironment of the small lake filled with volcanogenic deposits during calm period of the volcanic activity. The composition of the rich flora support the subtropical climate of this time interval with frostless winters and the vegetation corresponds to the mixed mesophytic forest with a considerable representation of thermophilic elements surviving from the latest Eocene (Radoň et al. 2006). Sparse and fragmentary record of entomofauna encountered several specimens of the family Curculionidae (Coleoptera) besides numerous not identifiable (Prokop 2003).

MATERIAL AND METHODS

The locality of Holý Kluk hill is situated about 0.5 km NE from village Proboštov and about 7 km SE from Ústí nad Labem (N 50°37'54", E 14°09'21"). All material was gathered by M. Radoň (curator of the Teplice Regional Museum) during his field prospecting of old known Tertiary palaeontological localities in České středohoří Mts. The specimens are housed in the collection of the Teplice Regional Museum in northern Bohemia. Specimens were observed in dry state or under ethyl-alcohol by stereomicroscope Olympus SZX9. We follow the terminology of external morphology as proposed by Andersen (1998).

SYSTEMATIC PALAEONTOLOGY

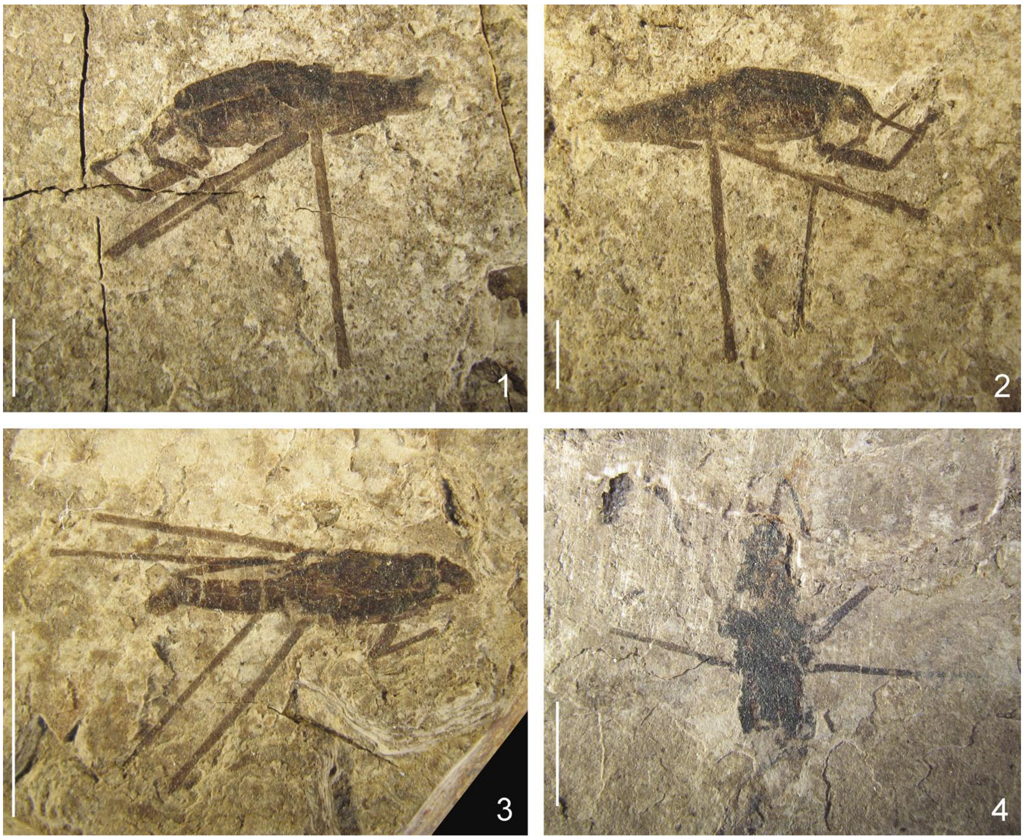
Gerromorpha Popov, 1971
Family Gerridae Leach, 1815
Subfamily Gerrinae Bianchi, 1896 (genus and species undetermined)

(Figs 1–3)

Description. **Specimen HK01**: print and counterprint of a specimen in lateral position. Head dark, 1.1 mm long, 0.8 mm high, diameter of eye 0.5 mm, no visible ocelli, rostrum long, 1.9 mm long, its apex surpassing prosternal hind margin for 1.2 mm; first antennomere visible, about 1.1 mm long; ventral lobes of head reduced. Thorax 2.4 mm long, 2.3 mm high; lateral intersegmental suture between meso- and metathorax not visible; mesothorax prolonged; mesoscutellum reduced; wings not visible, apparently absent or very reduced; legs long and slender, prothoracic femur 2.2 mm long, 0.5 mm wide, tibia 1.2 mm long, 0.3 mm wide; meso- and metathoracic coxae horizontal, mesothoracic femur 6.1 mm long and 0.4 mm wide, metathoracic femur 6.0 mm long, 0.4 mm wide; tibia and tarsi not preserved. Abdomen 4.5 mm long, 1.7 mm high, external genitalia not visible.

HK02: print of a specimen in dorsal view; head dark, 1.0 mm long, 1.0 mm wide, diameter of eye 0.5 mm, no visible ocelli, rostrum and antennae not visible. Thorax 2.3 mm long, 1.9 mm wide; lateral intersegmental suture between meso- and metathorax not visible; mesoscutellum reduced; wing visible, reduced, 2.8 mm long (brachypterous); legs long and slender, prothoracic femur 1.3 mm long, 0.5 mm wide, tibia 3.0 mm long, 0.2 mm wide; meso- and metathoracic coxae horizontal, mesothoracic femur 6.1 mm long and 0.4 mm wide, metathoracic femur 6.0 mm long, 0.4 mm wide; tibia and tarsi not preserved. Abdomen 5.1 mm long, 0.9 mm wide, external genitalia not visible.

HK03: print of a specimen in dorsal view; head very poorly preserved, useless. Thorax 2.3 mm long, 2.5 mm wide; dark with two lateral brown stripes; lateral intersegmental suture between meso- and metathorax not visible; mesothorax prolonged; mesoscutellum reduced; wing not visible; legs long and slender; prothoracic femur very poorly preserved; mesothoracic femur 6.2 mm long and 0.4 mm wide, tibia shorter than femur, without rows of spinous hairs; metathoracic femur 6.2 mm long, 0.4 mm wide; tibia and tarsi not preserved. Abdomen 4.8 mm long, 2.0 mm wide, external genitalia not visible.



Figs 1–4. Gerrinae genus and species undetermined. 1,2 – photographs of specimen HK01, 3 – photograph of specimen HK02, 4 – photograph of specimen HK03. Scale 5 mm.

Material examined. Three specimens are almost complete bodies; HK01 is laterally preserved, HK02 and HK03 dorsally preserved; all housed in coll. of Teplice Regional Museum (Czech Republic).

Age and layer. Early Oligocene, about 29–30 Ma according to the radiometric data, Nové Sedlo Formation, Holý Kluk hill site near Litoměřice, České středohoří Mts (Czech Republic).

DISCUSSION

Following Andersen's (1982) phylogenetic analysis, our specimens fall to family Gerridae because of the prolonged mesothorax and meso- and metathoracic coxae horizontal, and in the subfamily Gerrinae because of combination of the following characters: ventral lobes of head reduced (apomorphy of Gerridae minus Rhagadotarsinae); lateral intersegmental suture between meso- and metathorax not visible, indistinct or lost, apomorphy of ((Gerrinae + Eotrephinae) + (Cylindrostethinae + Ptilomerinae + Halobatinae)); rostrum long and slender, its apex surpassing the prosternal hind margin, plesiomorphy that would exclude our fossils from the group (Cylindrostethinae + Ptilomerinae + Halobatinae); middle tibia without rows of spinous hairs, plesiomorphy that would exclude them from the Eotrechinae; middle femur slender, longer than middle tibia, plesiomorphy that would exclude them from Trepobatinae. Unfortunately we are unable to examine the structure apomorphic of Gerrinae, i.e. dorsal plate of vesica distinctly sclerotized due to the poor state of preservation. Lastly, the elongate pronotal lobe is a plesiomorphy also present in some Charmatometrinae and Gerrinae (Andersen 1982: 201, 205).

The elongate abdomen of these fossils, longer than meso- and metasternum together is an apomorphic character convergently present in the recent genus *Limnometra* Mayr, 1865 and the clade (*Gigantometra* Hungerford & Matsuda, 1958 + (*Aquarius* Schellenberg, 1800 + (*Limnoporus* Stål, 1868 + (*Geriselloides* Hungerford & Matsuda, 1958+ (*Macrogerris* Andersen, 1994 + *Gerris* Fabricius, 1794))))) (Andersen 1995). Our fossils share with *Gerris* the length of first antennal segment less than 1.3x head length, the median longitudinal carina of pronotal lobe present, and the fore femur thicker than middle femur (Andersen 1998). Nevertheless, after Andersen (1995) phylogenetic analysis and key to gerrine genera, it is not possible to accurately attribute our fossils to a precise gerrine genus because of the lack of information on several crucial structures, viz. structure and position of the metathoracic spiracle, proportion of antennomeres, of tibia and femora. They could belong to the genus *Gerris*, but we prefer to maintain them as Gerrinae of uncertain affinities.

Recently two fossil gerrid genera with uncertain subfamily attribution were described from the Middle Eocene deposits of Germany (Wappler & Andersen 2004). First genus *Lutetiabates* Wappler et Andersen, 2004 differs from our specimens in its shorter abdomen, while the second genus *Cylindrobates* Wappler et Andersen, 2004 has a distinctly more elongate body with a very short pronotum.

The presence of gerrid fossils in the small diatom/tuffite lake could be related to a mechanism of low transport of the dead insect from the surface to the bottom via a diatom mat (Nel 1991). Thus they are of interest for the reconstruction of the physico-chemistry of this paleolake.

The plant/insect assemblage of the Holý Kluk hill in bedded tuffitic claystone with a small proportion of diatoms is preserved in two characteristic facies. First bearing coarser plant fossils is followed by low energy sedimentation fining upwards. A lake with calm waters may be expected as sedimentary environment, which arose during a short period of low volcanic activity (Radoň et al. 2006).

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Morphological variation and distribution of *Colon* (*Myloechus*) *koghiense* (Coleoptera: Leiodidae) from the New Caledonia

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Abstract. A previously unknown female and a morphological variability of *Colon* (*Myloechus*) *koghiense* Perreau, 2004, an endemic species of the New Caledonia, is described and figured. Known distribution within the New Caledonia is mapped.

Morphology, distribution, Coleoptera, Leiodidae, Coloninae, *Colon*, New Caledonia, Australian region

INTRODUCTION

The genus *Colon* Herbst, 1797 has approximately 150 so far described species worldwide (Peck & Stephan 1996), separated into seven subgenera (Szymczakowski 1963, 1964, 1969, Peck & Stephan 1996). Only eight species (in four subgenera) have been reported from Australasia (Szymczakowski 1964: 57–58), recently Perreau (2004) described *Colon* (*Myloechus*) *koghiense* from the New Caledonia, based on two males collected by Ivan Löbl. This was the first report of the genus from the Pacific islands, and also first representative of the subgenus *Myloechus* Latreille, 1807 from Australian region (Perreau 2004).

In this paper, a newly collected material of *C.* (*M.*) *koghiense* from the New Caledonia is reported, based on specimens taken mostly by using flight-intercept traps by G. Monteith (Queensland Museum, Brisbane). Altogether, 119 specimens were collected. We describe a previously unknown female of this species and include additional notes on morphological variation of this species, including male sexual characters. Known distribution within the New Caledonia is mapped.

MATERIAL AND METHODS

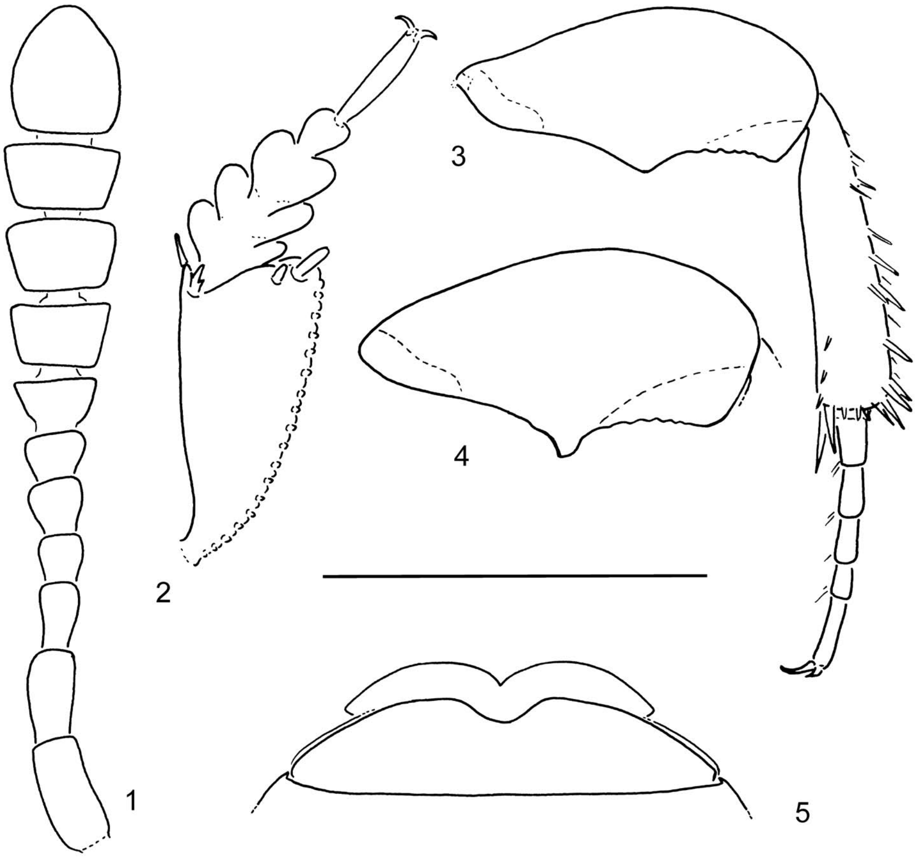
Majority of the material is deposited in the Queensland Museum, Brisbane (QMBA); some doublets are also in the private collections of the authors. Material is dry-mounted and glued on points or cards, at least three male specimens from majority of the localities were dissected and the shape of metafemur and aedeagus was examined under magnification up to ×100. Only arbitrarily selected specimens were measured, covering the extremes in size, with precision 0.05 mm.

Listed below are corrected coordinates, provided by G. Monteith (in litt.), not those on labels; these coordinates were also used when producing the distribution map. Material is listed in a chronological order, the abbreviation FIT is used for flight-intercept trap. Morphological terminology follows those of Peck & Stephan (1996).

RESULTS

Colon (*Myloechus*) *koghiense* Perreau, 2004

Colon (*Myloechus*) *koghiense* Perreau, 2004: 209, figs 20–21; type locality: New Caledonia, Mt. Koghi, 500–600 m.



Figs 1–5. *Colon* (*Myloechus*) *koghiense* Perreau: 1 – antenna dorsally; 2 – male protibia and protarsus ventrally; 3 – male minor, metaleg ventrally; 4 – male major, metafemur ventrally; 5 – female ventrite IV–V, ventrally. Scale 0.25 mm for Fig. 1, 0.19 mm for Fig. 2, 0.37 mm for Figs 3–4 and 0.39 mm for Fig. 5.

Material examined. **New Caledonia:** 8919, Pic du Grand Kaori, 22°17’00”S 166°53’46”E, 250 m, 21 Nov 2001 – 29 Jan 2002, G. Monteith, FIT, 1 male, 1 female; 8925, Aoupinie, top camp, 21°10’44”S 165°18’10”E, 850 m, 23 Nov 2001 – 1 Feb 2002, G. Monteith, FIT, 6 males, 10 females; 8930, Aoupinie, sawmill, 21°09’20”S 165°19’12”E, 550 m, 23 Nov 2001 – 1 Feb 2002, G. Monteith, FIT, 1 male; 11431, Hwy 8km SW of Pombey, 20°54’30”S 165°07’26”E, 300 m, 28 Nov 2003, G. Monteith, Pyrethrum, trees & logs, 4 females; 11462, Bois du Sud, 22°10’21”S 166°45’42”E, 180 m, 6 Dec 2003 – 25 Jan 2004, G. Monteith, FIT, 1 female; 11463, Riv. Bleue turnoff, 22°10’11”S 166°44’37”E, 180 m, 6 Dec 2003 – 25 Jan 2004, G. Monteith, FIT, maquis, 1 female; 11464, Col de Mouirange, 22°12’48”S 166°39’57”E, 200 m, 6 Dec 2003 – 25 Jan 2004, G. Monteith, FIT, 4 males, 11 females; 11465, Dzumac Road, junction, 22°01’54”S 166°27’59”E, 950 m, 5 Dec 2003 – 26 Jan 2004, G. Monteith, FIT, 1 male, 4 females; 11467, Dzumac Road, 22°05’15”S 166°26’41”E, 700 m, 5 Dec 2003 – 26 Jan 2004, G. Monteith, FIT, 1 male, 1 female; 11468, Mt. Mou base, 22°04’31”S 166°19’52”E, 350 m, 7 Dec 2003 – 2 Feb 2004, G. Monteith, flight int. trap, 3 males, 8 females; 11472, R. Dothio, 8km WNW Thio, 21°35’13”S

166°09’10”E, 24 Nov 2003 – 28 Jan 2004, G. Monteith, FIT, 1 female; 11475, Col d’Amieu, west slope, 21°36’36”S 165°48’37”E, 470 m, 25 Nov 2003 – 27 Jan 2004, G. Monteith, FIT, 2 males, 5 females; 11476, Cole d’Amieu, sawmill, 21°35’33”S 165°48’19”E, 400 m, 25 Nov 2003 – 27 Jan 2004, G. Monteith, FIT, 1 male, 3 females; ditto, but 11477, Malaise, 2 males, 1 female; 11482, Pic d’Amoa, N slopes, 20°57’22”S 165°17’27”E, 500 m, 27 Nov 2003 – 30 Jan 2004, G. Monteith, FIT, 7 males, 7 females; 11485, Touho TV tower, 20°47’56”S 165°13’50”E, 400 m, 28 Nov 2003 – 30 Jan 2004, G. Monteith, FIT, 7 males, 4 females; 11486, Mandjelia summit, 20°23’47”S 164°31’54”E, 750 m, 29 Nov 2003 – 31 Jan 2004, G. Monteith, FIT, 2 males, 3 females; 11487, Mandjelia, lower creek, 20°24’08”S 164°31’21”E, 550 m, 29 Nov 2003 – 31 Jan 2004, G. Monteith, FIT, 2 males, 3 females; 11489, Col d’Amoss Picnic Area, 20°19’03”S 164°25’24”E, 29 Nov 2003 – 31 Jan 2004, G. Monteith, FIT, 2 males, 1 female; ditto, but 11490, Malaise, 1 male, 1 female; 11492, Creek du Bambou, 20°27’48”S 164°20’05”E, 1 Dec 2003 – 31 Jan 2004, G. Monteith, FIT, 5 males, 3 females; 11493, Nehoue campground, 20°25’02”S 164°13’16”E, 50 m, 1 Dec 2003 – 1 Feb 2004, G. Monteith, FIT, 1 female.

MORPHOLOGICAL VARIATION. Body length (combined medium length of pronotum + elytra) 1.25–1.80 mm in males, 1.15–1.80 mm in females. Pronotum robust and more elongate in major males (ratio of width to medium length = 1.35); shorter and wider in minor males (ratio = 1.40–1.50) and females (ratio = 1.40–1.55). Submentum with obvious microsculpture and with additional punctures scattered at random, of which some are coarse. Protibia wide, straight, gradually widening to apex, with trifurcate ventral thorn (Fig. 2). Metafemur with small tooth in middle of the posterior margin, sharp in male major (Fig. 4), less prominent and obtuse (but always present) in male minor (Fig. 3); metatibia straight (Fig. 3). Female with posterior margin of visible abdominal ventrite IV widely emarginate, also weakly sclerotized ventrite V with sharp, v-shaped emargination (Fig. 5).

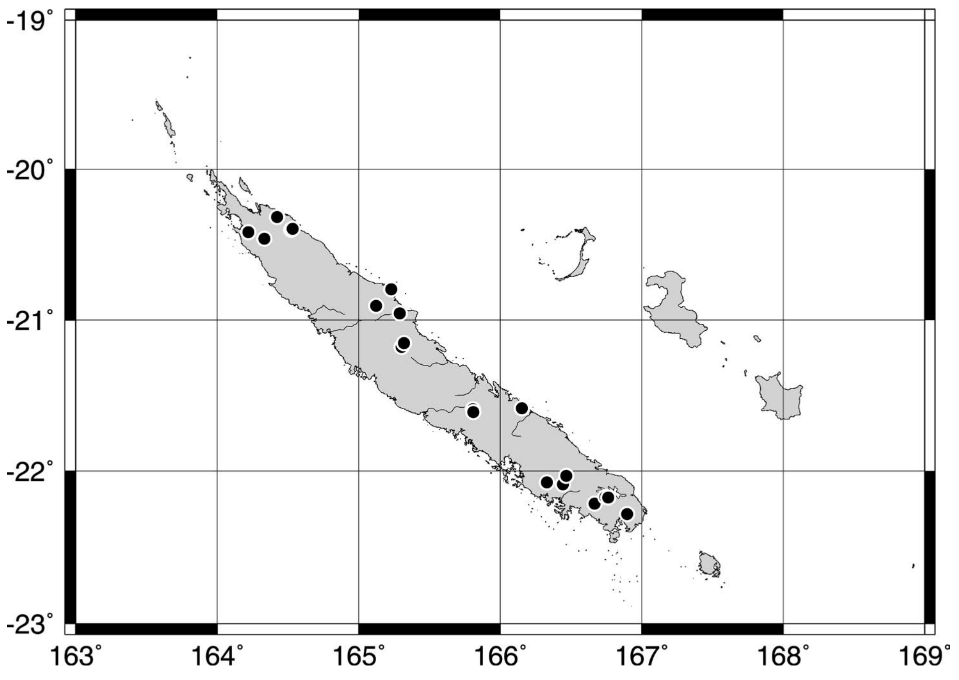


Fig. 6. Known distribution of *Colon* (*Myloechus*) *koghiense* Perreau through New Caledonia.

Collection circumstances. Collections with altitude widely varies between 50–950 m. Most specimens were taken using the flight-intercept traps, in the period between the end of November to the beginning of February.

Distribution. Endemic species of the New Caledonia, where it seems to be widely distributed (Fig. 6).

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New record of the Blue bream (*Abramis ballerus*) in the Elbe River in the Czech Republic

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Abstract. A single specimen of blue bream (*Abramis ballerus* (Linnaeus, 1758)) was caught on June 16th, 2003 in the Elbe River, under a weir in the village Střekov. It is the first record of this species in the Czech part of the Elbe River or its drainage after 77 years. This specimen was a five years old female of the total length 370 mm. Basic meristic and morphometric characteristic are given.

Distribution, new record, blue bream, Pisces, *Abramis ballerus*, Elbe River, Palaearctic region

INTRODUCTION

Blue bream *Abramis ballerus* (Linnaeus, 1758) is distributed in rivers belonging to the northern parts of the Black Sea, Sea of Azov and Caspian Sea basins, further in the Baltic Sea and its inflows and in the rivers flowing to the south eastern part of the Northern Sea including the Elbe River basin (Bănărescu 1964).

In the Czech Republic, the distribution of this species is recently limited to the lower stretches of the rivers Morava and Dyje (Lusk et al. 2002). However, there are old records of this species from the Elbe drainage. First specimen was caught on January 26th, 1904 in the Vltava River at Kralupy nad Vltavou (Frič & Vávra 1904). This specimen is deposited in the ichthyologic collection of the National Museum in Prague. Further three specimens (two males and one female) were found on October 31st, 1926 in a pool close to the Vltava River near the village Kozárovice (Schäferna 1928). Unfortunately, these specimens have been lost (Oliva 1951). Oliva (1951) provided information about other four specimens from the Schäferna's collection, and he assumed that they could originate from the lower Vltava. However, the origin of this material is uncertain. Thus, only four specimens of blue bream have been surely caught in the Elbe River drainage in the Czech Republic and the species has not been recorded for the last 77 years from this area.

RESULTS

On June 16th, 2003, one specimen of blue bream was caught from a boat by electrofishing using pulsed DC (600V/4A) in the Elbe River, under a weir at the village Střekov, 40.4 km from the German state border. Geographic coordinates of the locality are N 50°38.327', E 14°02.791'. The specimen was immediately measured using calliper with accuracy to the nearest mm, and weighed on balances WEDO Accurat 5000 with accuracy to 1 g. Several meristic and morphometric characteristic were measured (following Holčík (1989)) on the left side of the fresh specimen before preservation.

The specimen was a female of the total length 370 mm, body length 306 mm and weight 305 g. Meristic characteristic are as follows: D III, 8; A III, 36; P I, 14; V II, 8; C 18; lateral line scales 67, scale rows above the lateral line 17, scale rows below the lateral line 9.

Morphometric measurements in mm are as follows: maximum body depth 87.4, minimum body depth 20, body width 29.3, length of head 58, head width 34, head depth 52, preorbital distance 12.9, postorbital distance 32, interorbital distance 23.3, diameter of eye 16, upper jaw length 24.4, predorsal distance 150.1, preventral distance 122.5, preanal distance 177, length of caudal peduncle 47.2, distance between pectoral and ventral fin 54.9, distance between ventral and anal fin 51, length of dorsal fin base 30.05, length of anal fin base 96, length of pectoral fin base 54.9, length of ventral fin base 47.2, length of caudal fin 76.

The age of the specimen was determined from scales. The age was five years (4+). The ovaries of the female were empty and numerous small wounds were visible on the body surface. This indicates that the female spawned.

This specimen is deposited in the ichthyologic collection of the National Museum in Prague under the catalogue number NMP6V 80726.

DISCUSSION

The occurrence of the blue bream in the Elbe River in the Czech Republic shifts again the east boundary of the distribution area of this species in the Elbe drainage. In Germany, blue bream is common in lower and middle parts of the Elbe River up to Dresden (Füllner et al. 1996). Several factors could have influenced the occurrence of this species in the Czech part of the Elbe river: increasing water quality during the last decade, building of functional fish ways in the German part of the river, and probably also the extreme floods in summer 2002, which significantly modified the river bottom structure over large areas.

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Gall midges (Diptera: Cecidomyiidae) of Bosnia and Hercegovina

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Abstract. The present fauna of gall midges of Bosnia and Hercegovina includes 169 species. Of them, the following 28 are new records for Bosnia and Hercegovina, see *Ametrodiplosis urticae* Kovalev,1972, *Clinodiplosis oleracei* Rübsaamen, 1917, *C. socialis* (Winnertz, 1853), *Contarinia lepidii* Kieffer, 1909, *C. loti* (De Geer, 1776), *C. sambuci* (Kaltenbach, 1873), *C. tritici* Kirby, 1798), *Craneiobia corni* (Giraud, 1863), *Cystiphora taraxaci* (Kieffer, 1888), *Dasineura acrophila* (Winnertz, 1853), *D. capsulae* (Kieffer, 1901), *D. hyperici* (Bremi, 1847), *D. lathyri* (Kieffer, 1909), *D. lupulinae* (Kieffer, 1891), *D. mali* (Kieffer, 1904), *D. napi* (Loew, 1850) (= *Cecidomyia brassicae* Winnertz, 1853), *D. oleae* (F. Löw, 1885), *D. pteridicola* (Kieffer, 1901), *Feltiella tetranychi* (Kieffer, 1908), *Harmandiola tremulae* (Winnertz, 1853), *Jaapiella jaapiana* (Rübsaamen, 1914), *J. medicaginis* (Rübsaamen, 1912), *Janetiella thymi* (Kieffer, 1888), *Massalongia rubra* (Kieffer, 1890), *Oligotrophus panteli* Kieffer, 1898, *Rabdophaga salicis* (Schrank, 1803), *Sitodiplosis mosellana* (Géhin, 1856) and *Zeuxidiplosis giardi* (Kieffer, 1896). Zoogeography: the majority (50%) are European, 29% Euro-Siberian, 14% Mediterranean and sub-Mediterranean and 7 % are Holarctic species. Economic importance: Only *Contarinia medicaginis* Kieffer, 1895 on *Medicago sativa* L. and *Dasineura pyri* (Bouché, 1847) on *Pyrus communis* L. occurred at higher levels. Eleven gall midge species which occurred as pests of cultivated plants in adjacent areas are potential pests in Bosnia and Hercegovina. The annotated list of all gall midge species occurring in Bosnia and Hercegovina, together with host plant species, references, new localities and distribution is given.

Distribution, zoogeography, plant-insect interactions, economic importance, check-list, Diptera, Cecidomyiidae, Balkan peninsula, Bosna & Hercegovina, Palaearctic region

INTRODUCTION

This article is a continuation of a series devoted to gall midge faunas of some countries of the Balkan peninsula of which the first was on gall midges of Slovenia (Simova-Tošić et al. 1996), then of Serbia (Simova-Tošić et al. 2000), of Monte Negro (Simova-Tošić & Skuhravá 2001) and of Croatia (Simova-Tošić et al. 2004). In the present article we summarize results of investigations of gall midges in Bosnia and Hercegovina during the 20th century and bring many new records.

The oldest findings from the territory Bosnia and Hercegovina are two gall midge species, viz. *Wachtliella ericina* and *Lestremia leucophaea*, found before the end of the 19th century. The galls of *Cecidomyia ericina* (now correctly: *Wachtliella ericina*) were found at "Hritberg bei Pasariċ" by O. von Möllendorff (Hieronymus 1890) and the female of *Lestremia leucophaea* was caught by Strobl near Sarajevo (Strobl 1893). During the years 1913–1914 E. Baudyš, the outstanding Czech phytopathologist, worked as a special clerk in the tabacco factory in Sarajevo and simultaneously also in the Provincial Museum in Sarajevo where he started to build the collections of plant galls. He collected galls at various localities in Bosnia and Hercegovina (Baudyš 1915). Later K. Maly, the curator of the Provincial Museum in Sarajevo, sent to E. Baudyš some galls collected at various parts of former Yugoslavia which E. Baudyš identified and published in a large article with many new data on the occurrence of galls of various insects and mites (Baudyš 1928). After several years he was once more asked by the management of the Provincial Museum in Sarajevo to identify plant galls which were collected mainly by K. Maly and W. Loschnigg. Results are involved in the third article (Baudyš 1940). Skuhravá & Skuhravý (1964) summarized the knowledge of gall midges known in former Yugoslavia and contributed with new records.

Szadziewski (1975) caught adults of nine gall midge species at various localities in Yugoslavia using different collecting methods, viz. netting, dishes with water and light. Of them, two gall midge species were caught in Bosnia-Hercegovina. Simova-Tošić et al. (1982) studied the biology and the parasitoids of gall midges inhabited the female birch catkins in Bosnia and Hercegovina. Janežić (1987, 1988) collected galls at eight localities in Bosnia and Herzegovina and found galls of 69 gall midge species of which 33 were new records. Popo (1977) investigated insects pests of *Abies alba* and *Picea abies* and found in cones among other insects also three gall midge species, viz. *Resseliella piceae*, *Plemeliella abietina* and *Kaltenbachiola strobi*.

The territory of Bosnia and Hercegovina covers an area of 51,139 km^2 and is in the south-western part of Balkan peninsula between Croatia, Serbia and Monte Negro. It is mostly mountainous with lowlands along rivers and in northern part of the country. The terrain sometimes reaches heights of more than 1,800 m a.s.l. and heights drops abruptly towards the Adriatic Sea. The mountains Maglic, 2,396 m a. s. l., Cvrsnica, 2,228 m a. s. l. and Prenj, 2,155 m a. s. l., are the highest mountains. The land is drained by the Sava and Neretva rivers and their tributaries. The mountains are covered with broad-leaved deciduous, mixed and coniferous forests. The territory is noted for its limestone formations and limestone phenomena and is also rich on submersive (abysmal) rivers. The longest rivers are Drina on the border with Serbia, Sava on the borber with Croatia and Neretva which ends in the Adriatic Sea. The climat of Bosna and Hercegovina is mild continental with wide range of variations from continental to Mediterranean type.

From the biogeographical point of view, the main part of Bosnia and Hercegovina belongs to to the Province of Balkan Highlands and narrow strip along western boundary to the Mediterranean Sclerophyll Province (Udvardy 1975).

MATERIAL AND METHODS

The list of gall midge species was compiled from all papers of previous researchers dealing with the occurrence of gall midges and their galls in Bosnia and Hercegovina. The first author in the course of 1966–1988 collected galls of gall midges at 49 localities of Bosnia and Hercegovina (Fig. 1). Part of galls was collected by Prof. Dr Nerad Dimić from Sarajevo.

Gall midge galls were identified using the keys for identification of Buhr (1964–1965) and Houard (1908–1909), larvae according to Möhn (1955), adults according to Skuhravá (1997). We analyzed the gall midge fauna using zoogeographical methods of Skuhravá (1987, 1994, 1997). The economic importance has been evaluated according to Darvas et al. (2000), Skuhravá & Roques (2000) and Skuhravý & Skuhravá (1996). Nomenclature of gall midges is according to Skuhravá (1986, 1989) and Gagné (2004), nomenclature of host plants according to Tutin et al. (1964, 1968, 1972, 1976, 1980) and Lauber-Wagner (2001).

ANNOTATED LIST OF GALL MIDGE SPECIES

For each species the following data are given: host plant (or animal) species, plant family, references to articles of earlier authors with published records on occurrence; unpublished localities where the species was found in the period 1966–1988; distribution in the Palaearctic region according to Skuhravá (1986, 1997b); synonyms and combinations after Skuhravá (1986) and Gagné (2004); for some species the additional data are given about their economic importance (pest, or potential pest). An asterisk (*) before the species name indicates a new record for the fauna of Bosnia and Hercegovina.

Acericecis szepligetii (Kieffer, 1909)
Oligotrophus szepligetii Kieffer, 1909
Host: *Acer tataricum* L. (Aceraceae). References: Baudyš 1940; Skuhravá & Skuhravý 1964; Janežić 1987, 1988. Localities: Igman, Srpski Brod, Vršani (Bjelina). Distribution: European, Pannonian.

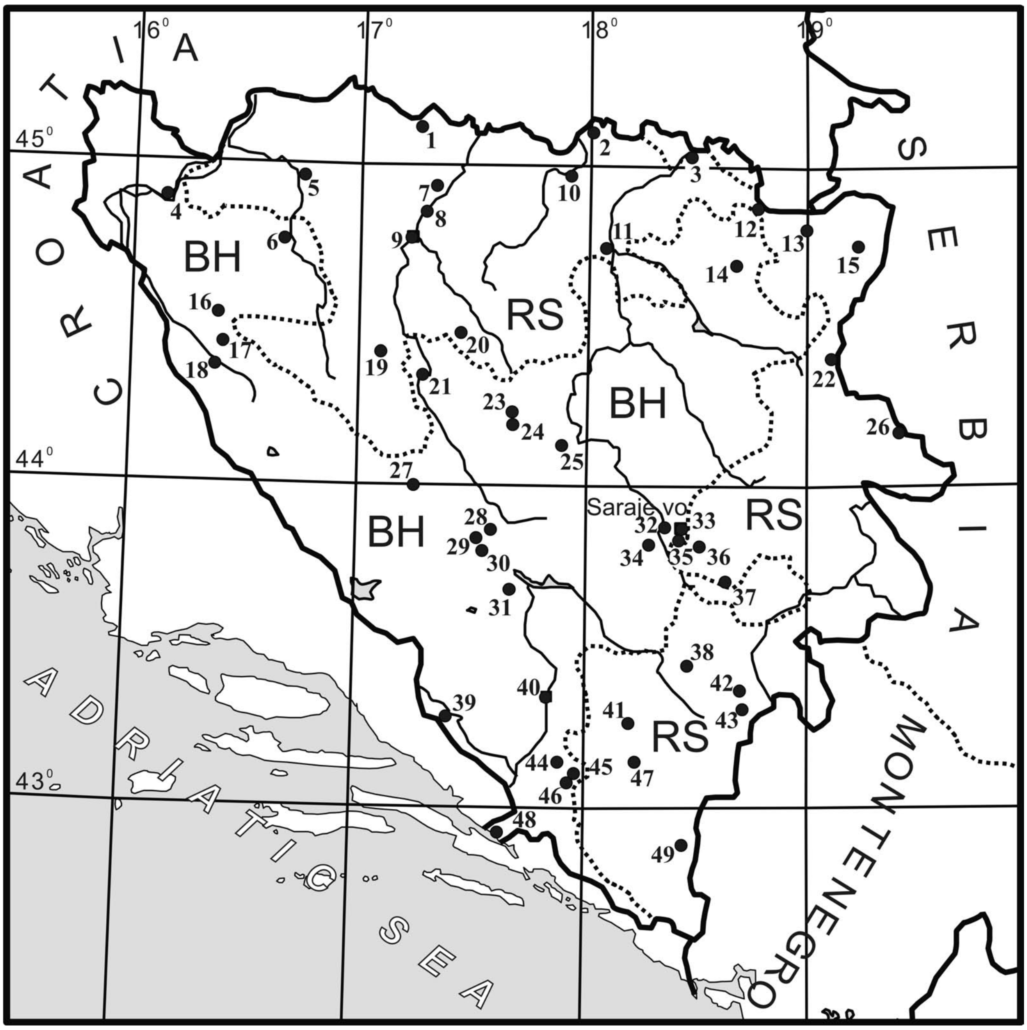

Fig. 1. Sketch map of Bosnia and Hercegovina with localities where gall midge galls were collected, BH – Federation of Bosnia and Herzegovina, RS – Serb Republic: 1 – Gradiška, 2 – Srpski Brod, 3 – Šamac, 4 – Krupa, 5 – Prijedor, 6 – Sanski most, 7 – Laktaši, 8 – Vrbas (Trn), 9 – Banja Luka, 10 – Derventa, 11 – Doboj, 12 – Brčko, 13 – Vršani, 14 – Koraj, 15 – Bijelina, 16 – Bosanski Petrovac, 17 – Crvljivica, 18 – Drvar, 19 – Mrkonjić Grad, 20 – Skender Vakuf, 21 – Jajce, 22 – Zvornik, 23 – Travnik, 24 – Novi Travnik, 25 – Kaonik, 26 – Donja Ljubovija, 27 – Kupres, 28 – Makljen, 29 – Novi Prozor, 30 – Prozor, 31 – Jablanica, 32 – Ilidja, 33 – Sarajevo, 34 – Igman, 35 – Hromolj, 36 – Pale, 37 – Jahorina, 38 – Zelen Gora, 39 – Šipovača, 40 – Mostar, 41 – Nevesinje, 42 – Tjentište (Dragoš Sedlo, Prijevoj, Suha), 43 – Peručac, 44 – Crnići, 45 – Stolac, 46 – Poplat, 47 – Berkovići, 48 – Neum, 49 – Bileća.

***Acericecis vitrina* (Kieffer, 1909)**
Perrisia vitrina Kieffer,1909
Dasineura vitrina (Kieffer,1909)
Harrisomyia vitrina (Kieffer, 1909)
Host: *Acer pseudoplatanus* L. (Aceraceae). References: Baudyš 1915; Skuhravá & Skuhravý 1964. Locality: Igman. Distribution: European.

Anthodiplosis rudimentalis (Kieffer, 1901)
Clinodiplosis rudimentalis Kieffer, 1901
Ametrodiplosis rudimentalis (Kieffer, 1901)
Host: *Artemisia vulgaris* L. (Asteraceae). Reference: Janežić 1988. Distribution: European.

Ametrodiplosis thalictricola (Rübsaamen, 1895)
Host: *Thalictrum minus* L. (Ranunculaceae). References: Baudyš 1940; Skuhravá & Skuhravý 1964. Distribution: Euro-Siberian.

****Ametrodiplosis urticae*** Kovalev, 1972
Host: Inquiline in galls of *Dasineura urticae* on *Urtica dioica* L. (Urticaceae). Localities: Banja Luka, Bjelina, Ilidja. Distribution: Euro-Siberian.

Anisostephus betulinus (Kieffer,1889)
Host: *Betula pendula* Roth. (*Betulaceae*). References: Baudyš 1940; Skuhravá & Skuhravý 1964. Distribution: Euro-Siberian.

Arnoldiola libera (Kieffer, 1909)
Perrisia libera Kieffer, 1909
Dasineura libera (Kieffer, 1909)
Host: *Quercus petraea* (Matt.) Lieb., *Q. pubescens* Willd. (Fagaceae). References: Baudyš 1940; Skuhravá & Skuhravý 1964. Distribution: European.

Aphidoletes aphidimyza (Rondani, 1847)
Host: larvae prey on more than 30 aphid species on different plant species and genera (Harris 2004). Reference: Szadziewski 1975. Localities: Banja Luka, Ilidja, Tjentište. Distribution: Holarctic.

Aschistonyx carpinicolus Rübsaamen, 1917
Host: *Carpinus betulus* L. (Corylaceae). References: Baudyš 1940; Skuhravá & Skuhravý 1964; Janežić 1988. Distribution: European.

Asphondylia baudysi Vimmer, 1937
Host: *Coronilla varia* L. (Fabaceae). References: Baudyš 1940; Skuhravá & Skuhravý 1964. Distribution: European.

Asphondylia calaminthae Kieffer, 1909
Host: *Calamintha officinalis* Mch. (Lamiaceae). References: Baudyš 1915, 1940; Skuhravá & Skuhravý 1964. Distribution: sub-Mediterranean.

Asphondylia calycotomae Kieffer, 1912
Host: *Calicotome intermedia* D.C. (Fabaceae). References: Baudyš 1915; Jaap 1920; Skuhravá & Skuhravý 1964. Distribution: Mediterranean.

Asphondylia coronillae (Vallot, 1829)
Host: *Coronilla emerus* L. (Fabaceae). Reference: Janežić 1987. Distribution: sub-Mediterranean.

Asphondylia miki Wachtl, 1880
Host: *Medicago sativa* L. (Fabaceae). References: Baudyš 1915; Skuhravá & Skuhravý 1964. Localities: Banja Luka, Sarajevo. Distribution: Euro-Siberian, secondarily Holarctic. Pest.

Asphondylia pruniperda Rondani, 1867
Host: *Prunus domestica* L., *P. spinosa* L., *P. pissardii* Carr. (Rosaceae). Reference: Janežić 1988. Distribution: European. Potential pest.

Asphondylia scrophulariae Schiner, 1856
Host: *Scrophularia canina* L. (Scrophulariaceae). References: Baudyš 1915; Skuhravá & Skuhravý 1964. Distribution: sub-Mediterranean.

Asphondylia verbasci (Vallot, 1827)
Host: *Verbascum austriacum* Schott., *V. thapsiforme* Schrad., *V. bosnense* Malý (Scrophulariaceae). References: Baudyš 1928, 1940; Skuhravá & Skuhravý 1964; Janežić 1987. Distribution: sub-Mediterranean.

Bayeriola thymicola (Kieffer, 1888)
Host: *Thymus serpyllum* L., *T. striatus* Vahl., *T. Kerneri* Borb. (Lamiaceae). References: Baudyš 1928, 1940; Skuhravá & Skuhravý 1964. Distribution: European.

Claspettomyia chrysanthemi (Panelius, 1965) (subfamily Porricondylinae)
Panelius (1965) gave information that adults were bred from *Chrysanthemum maximum* (Asteraceae). Reference: Szadziewski 1975. Distribution: European.

**** Clinodiplosis oleracei*** Rübsaamen, 1917
Host: *Cirsium arvense* L. (Asteraceae). Localities: Banja Luka, Doboj, Ilidja, Tjentište. Distribution: European.

****Clinodiplosis socialis*** (Winnertz, 1853)
Host: Larvae are inquilines in the galls of *Lasioptera rubi* (Schrank) on *Rubus* sp. (Rosaceae). Localities: Vrbas, Bjelina. Distribution: European.

Contarinia acerplicans (Kieffer, 1889)
Host: *Acer pseudoplatanus* L., *A. heldreichii* Orph. (Aceraceae). References: Baudyš 1915; Skuhravá & Skuhravý 1964. Localities: Igman, Tjentište. Distribution: European.

Contarinia ballotae Kieffer, 1898
Host: *Ballota nigra* L. (Lamiaceae). Reference: Janežić 1987. Distribution: European.

Contarinia carpini Kieffer, 1897
Host: *Carpinus betulus* L. (Corylaceae). References: Baudyš 1915, Skuhravá & Skuhravý 1964; Janezić 1988. Localities: Koraj, Pale, Tjentište. Distribution: European.

Contarinia campanulae (Kieffer, 1895)
Host: *Campanula rapunculoides* L. (Campanulaceae). References: Baudyš 1915; Skuhravá & Skuhravý 1964. Distribution: European.

Contarinia coryli (Kaltenbach, 1859)
Diplosis corylina F. Löw, 1878
Host: *Corylus avellana* L. (Corylaceae). Reference: Janežić 1988. Locality: Ilidja. Distribution: Euro-Siberian.

Contarinia craccae (Loew, 1850)
Contarinia craccae Kieffer, 1897
Host: *Vicia cracca* L., *V. sativa* L. (Fabaceae). References: Baudyš 1940; Skuhravá & Skuhravý 1964; Janezić 1987. Distribution: Euro-Siberian.

****Contarinia lepidii*** Kieffer, 1909.
Host: *Lepidium draba* L. (Brassicaceae). Locality: Bjelina. Distribution: European.

****Contarinia loti*** (De Geer, 1776)
Host: *Lotus corniculatus* L. (Fabaceae). Localities: Bjelina, Pale (Sarajevo). Distribution: European.

Contarinia luteola Tavares,1902
Host: *Quercus ilex* L. (Fagaceae). References: Baudyš 1940; Skuhravá & Skuhravý 1964. Distribution: Mediterranean.

Contarinia medicaginis Kieffer, 1895
Host: *Medicago sativa* L. (Fabaceae). Reference: Andjelić Stankelić & Tanić 1960. Localities: Banja Luka, Bjelina, Gradiška. Distribution: Euro-Siberian. Pest.

Contarinia melanocera Kieffer, 1904
Host: *Genista tinctoria* L. (Fabaceae). References: Baudyš 1915, 1940; Skuhravá & Skuhravý 1964. Distribution: European.

Contarinia nasturtii (Kieffer, 1888)
Host: *Brassica* spp., *Raphanus* spp., *Armoracia lapathifolia* Gilib. (Brassicaceae). References: Baudyš 1915, 1928, 1940; Skuhravá & Skuhravý 1964; Janežić 1988. Distribution: European. Potential pest.

Contarinia petioli (Kieffer, 1898)
Syndiplosis winnertzii Rübsaamen, 1911
Host: *Populus alba* L., *P. tremula* L. (Salicaceae). References: Baudyš 1915, 1928, 1940; Skuhravá & Skuhravý 1964. Distribution: Euro-Siberian.

Contarinia quercicola (Rübsaamen, 1899)
Host: *Quercus cerris* L. (Fagaceae). Reference: Janežić 1987. Distribution: Mediterranean.

****Contarinia sambuci*** (Kaltenbach, 1873)
Host: *Sambucus nigra* L. (Caprifoliaceae). Locality: Suha (Tjentište). Distribution: European.

Contarinia subulifex Kieffer, 1897
Host: *Quercus cerris* L. (Fagaceae). References: Baudyš 1915; Skuhravá & Skuhravý 1964. Distribution: Mediterranean.

Contarinia tiliarum (Kieffer, 1890)
Host: *Tilia cordata* Mill., *T. platyphyllos* Scop. (Tiliaceae). References: Baudyš 1928; Skuhravá & Skuhravý 1964. Localities: Banja Luka, Ilidja, Sarajevo. Distribution: Euro-Siberian.

Contarinia tragopogonis Kieffer, 1909
Host: *Tragopogon dubius* Scop. (Cichoriaceae). References: Baudyš 1915; Skuhravá & Skuhravý 1964. Distribution: European.

Contarinia tremulae Kieffer, 1909
Host: *Populus tremula* L. (Salicaceae). References: Baudyš 1928; Skuhravá & Skuhravý 1964 Distribution: European.

****Contarinia tritici*** (Kirby, 1798)
Host: *Triticum vulgare* L. (Poaceae). Localities: Banja Luka, Bjelina. Distribution: European, secondarily Holarctic, cosmopolitan. Pest.

****Craneiobia corni*** (Giraud, 1863)
Host: *Cornus sanguinea* L. and *C. mas* L. (Cornaceae). Localities: Jahorina, Jajce, Tjentište.
Distribution: sub-Mediterranean.

Cystiphora sanguinea (Bremi, 1847)
Cecidomyia hieracii F. Löw, 1874
Cystiphora pilosellae Kieffer, 1892
Host: *Hieracium murorum L.* (Asteraceae). References: Baudyš 1915, 1928, 1940; Skuhravá & Skuhravý 1964. Distribution: European.

Cystiphora sonchi (Vallot, 1827)
Cecidomyia sonchi Bremi, 1847
Host: *Sonchus arvensis* L. and *S. oleraceus* L. (Asteraceae). References: Baudyš 1915, 1940; Skuhravá & Skuhravý 1964; Janežić 1987. Distribution: Euro-Siberian.

****Cystiphora taraxaci*** (Kieffer, 1888)
Host: *Taraxacum officinale* Web. (Asteraceae). Localities: Banja Luka, Derventa, Prijedor. Distribution: Euro-Siberian.

****Dasineura acrophila*** (Winnertz, 1853)
Host: *Fraxinus oxycarpa* Willd. (Oleaceae). Locality: Tjentište. Distribution: European.

Dasineura affinis (Kieffer, 1886)
Host: *Viola odorata* L., (Violaceae). Reference: Janežić, 1988. Locality: Doboj, Sarajevo. Distribution: European.

Dasineura alyssi (Kieffer, 1901)
Host: *Alyssum calycinum* L. (Brassicaceae). References: Baudyš 1940; Skuhravá & Skuhravý 1964. Distribution: European.

Dasineura armoraciae (Vimmer, 1936)
Host: *Armoracia rusticana* G.M.Sch. (Brassicaceae). Reference: Janežić 1987. Distribution: European.

Dasineura auritae (Rübsaamen, 1915)
Host: *Salix aurita* L., *S. cinerea* L. (Salicaceae). References: Baudyš 1940; Skuhravá & Skuhravý 1964. Distribution: European.

Dasineura capsulae (Kieffer, 1901)
Host: *Euphorbia cyparissias* L., *E. helioscopia L.* (Euphorbiaceae). Localities: Banja Luka, Igman, Tjentište. Distribution: European.

Dasineura crataegi (Winnertz, 1853)
Host: *Crataegus monogyna* Jacq., *C. oxyacantha* L. (Rosaceae). References: Baudyš 1915, 1928; Skuhravá & Skuhravý 1964; Janežić 1987, 1988. Localities: Gradiška, Skender Vakuf, Tjentište. Distribution: European.

Dasineura fraxinea (Kieffer, 1907)
Host: *Fraxinus excelsior* L. (Oleaceae). References: Baudyš 1928, Janežić 1987. Distribution: European. Potential pest.

Dasineura fraxini (Bremi, 1847)
Host: *Fraxinus excelsior* L. (Oleaceae). References: Baudyš 1915, 1928; Skuhravá & Skuhravý 1964. Distribution: European. Potential pest.

Dasineura galiicaulis Stelter in Buhr, 1964
Host: *Galium mollugo* L. (Rubiaceae). Reference: Janežić 1987. Distribution: European.

Dasineura glechomae (Kieffer, 1889)
Host: *Glechoma hederacea* L. (Lamiaceae). Reference: Janežić 1987. Distribution: European.

Dasineura hyperici (Bremi, 1847)
Host: *Hypericum perforatum* L. (Hypericaceae). Locality: Bjelina. Distribution: European.

Dasineura irregularis (Bremi, 1847)
Cecidomyia acercrispans Kieffer, 1888
Host: *Acer pseudoplatanus* L. (Aceraceae). References: Baudyš 1915; Skuhravá & Skuhravý 1964; Janežić 1987, 1988. Distribution: European. Potential pest.

Dasineura lathyri (Kieffer,1909)
Host: *Lathyrus pratensis* L. (Fabaceae). Locality: Banja Luka. Distribution: Euro-Siberian.

Dasineura lupulinae (Kieffer, 1891)
Host: *Medicago lupulina* L. (Fabaceae). Localities: Banja Luka, Bjelina. Distribution: European.

* ***Dasineura mali*** (Kieffer, 1904)
Host: *Malus sylvestris* Mill. (Rosaceae). Localities: Pale, Tjentište. Distribution: European, secondarily Holarctic. Potential pest.

Dasineura medicaginis (Bremi, 1847)
Cecidomyia ignorata Wachtl, 1884
Host: *Medicago sativa* L. (Fabaceae). References: Baudyš 1915; Skuhravá & Skuhravý 1964. Localities: Banja Luka, Bjelina, Bosanski Petrovac. Distribution: Euro-Siberian. Pest.

* ***Dasineura napi*** (Loew, 1850)
Cecidomyia brassicae Winnertz, 1853
Host: *Brassica oleracea* L., *B. napus* L. (Brassicaceae). Localities: Banja Luka, Doboj. Distribution: European. Potential pest.

Dasineura oleae (F. Löw, 1885)
Host: *Olea europaea* L. (Oleaceae). Locality: Mostar. Distribution: Mediterranean. Pest.

Dasineura plicatrix (Loew, 1850)
Host: *Rubus caesius* L., *R. idaeus* L. (Rosaceae). References: Baudyš 1915; Skuhravá & Skuhravý 1964; Janežić 1987,1988. Localities: Doboj, Tjentište. Distribution: European. Potential pest.

Dasineura populeti (Rübsaamen, 1889)
Host: *Populus tremula* L. (Salicaceae). References: Baudyš 1940; Skuhravá & Skuhravý 1964; Janežić 1988. Distribution: Euro-Siberian.

Dasineura pteridicola (Kieffer, 1901)
Host: *Pteridium aquilinum* (L.) Kuhn. (Hypolepidaceae). Locality: Skender Vakuf. Distribution: European.

Dasineura pteridis (Müller, 1871)
Cecidomyia filicina Kieffer, 1889
Host: *Pteridium aquilinum* (L.) Kuhn. (Hypolepidaceae). Reference: Janežić 1988.
Locality: Skender Vakuf. Distribution: Euro-Siberian.

Dasineura pustulans (Rübsaamen, 1889)
Host: *Filipendula ulmaria* (L.) Maxim. (Rosaceae). References: Baudyš 1928, Skuhravá & Skuhravý 1964. Distribution: Euro-Siberian.

Dasineura pyri (Bouché, 1847)
Host: *Pyrus communis* L. (Rosaceae). References: Baudyš 1940; Skuhravá & Skuhravý 1964. Locality: Bjelina, Mostar. Distribution: European, secondarily Holarctic. Pest.

Dasineura rosae (Bremi, 1847)
Cecidomyia rosarum Hardy, 1850
Wachtliella rosarum (Hardy, 1850)
Host: *Rosa canina* L., *R. pendulina* L. (Rosaceae). References: Baudyš 1928, Janežić 1987, 1988. Localities: Bjelina, Sarajevo, Tjentište, Travnik. Distribution: Euro-Siberian.

Dasineura ruebsaameni (Kieffer, 1909)
Host: *Carpinus betulus* L. (Corylaceae). Reference: Janežić 1988. Distribution: European.

Dasineura sisymbrii (Schrank, 1803)
Host: *Rorippa silvestris* (L.) Bess. (Brassicaceae). References: Baudyš 1915, 1928, 1940; Skuhravá & Skuhravý 1964; Janežić 1987, 1988. Distribution: European.

Dasineura thomasiana (Kieffer, 1888)
Host: *Tilia tomentosa* Moench (Tiliaceae). References: Janežić 1987, 1988. Distribution: European.

Dasineura tiliae (Schrank, 1803)
Cecidomyia tiliamvolvens Rübsaamen, 1889
Host: *Tilia platyphyllos* Scop., *T. tomentosa* Moench. (Tiliaceae). References: Baudyš 1915, 1928; Skuhravá & Skuhravý 1964; Janežić 1987. Localities: Banja Luka, Laktaši. Distribution: Euro-Siberian.

Dasineura tortrix (F. Löw, 1877)
Host: *Prunus spinosa* L., *P. domestica* L. (Rosaceae). Reference: Janežić 1987. Localities: Banja Luka, Bjelina, Bosanski Petrovac, Mostar. Distribution: European. Potential pest.

Dasineura trifolii (F. Löw, 1874)
Host: *Trifolium pratense* L., *T. repens* L. (Fabaceae). References: Baudyš 1915; Skuhravá & Skuhravý 1964; Janežić 1987, 1988. Locality: Bjelina. Distribution: Euro-Siberian, secondarily Holarctic.

Dasineura tubularis (Kieffer, 1909)
Host: *Quercus cerris* L. (Fagaceae). Reference: Janežić 1988. Distribution: Mediterranean.

Dasineura tympani (Kieffer, 1909)
Host: *Acer campestre* L. (Aceraceae). References: Baudyš 1940; Skuhravá & Skuhravý 1964. Locality: Tjentiste. Distribution: European.

Dasineura ulmaria (Bremi, 1847)
Host: *Filipendula ulmaria* (L.) Maxim. (Rosaceae). Reference: Baudyš 1928, 1940; Skuhravá & Skuhravý 1964. Distribution: Euro-Siberian.

Dasineura urticae (Perris, 1840)
Host: *Urtica dioica* L. (Urticaceae). References: Baudyš 1928, 1940; Skuhravá & Skuhravý 1964; Janežić 1987, 1988. Localities: Banja Luka, Bjelina, Brčko, Ilidja, Mostar. Distribution: Euro-Siberian.

Dasineura viciae (Kieffer, 1888)
Host: *Vicia cracca* L., *V. sativa* L. (Fabaceae). References: Baudyš 1915, 1940; Skuhravá & Skuhravý 1964. Locality: Bjelina. Distribution: Euro-Siberian.

Dasineura violae (F. Low, 1880)
Host: *Viola tricolor* L., *V. elegantula* Schott. (Violaceae). References: Baudyš 1940; Skuhravá & Skuhravý 1964. Distribution: European.

Dasineura zimmermanni (Tavares, 1902)
Host: *Erica arborea* L. (Ericaceae). References: Baudyš 1940; Skuhravá & Skuhravý 1964. Distribution: Mediterranean.

Didymomyia tiliacea (Bremi, 1847)
Hormomyia reaumuriana F. Löw, 1878
Didymomyia reaumuriana (F. Löw, 1878)
Host: *Tilia cordata* Mill., *T. platyphyllos* Scop., *T. tomentosa* Moench (Tiliaceae). References: Baudyš 1940; Skuhravá & Skuhravý 1964; Janežić 1987. Locality: Suha (Tjentište). Distribution: Euro-Siberian.

Drisina glutinosa Giard, 1893
Massalongia aceris Rübsaamen, 1921
Host: *A. pseudoplatanus* L. (Aceraceae). References: Baudyš 1928, 1940; Skuhravá & Skuhravý 1964; Janežić 1987, 1988. Locality: Banja Luka. Distribution: European. Potential pest.

Dryomyia circinans (Giraud, 1861)
Host: *Quercus cerris* L., *Q. macedonica* DC (Fagaceae). References: Baudyš 1915, 1928, 1940; Skuhravá & Skuhravý 1964. Localities: Bileća, Berkovići, Nevesinje, Stolac. Distribution: Mediterranean.

**** Feltiella tetranychi*** (Kieffer, 1908)
Acaroletes tetranychi Kieffer,1908
Larvae feed on red spider mites (*Tetranychus telarius* L. (=*T. urticae* C. L. Koch) (Acarina: Tetranychidae). Localities: Banja Luka, Bjelina, Sarajevo. Distribution: Euro-Siberian.

Geocrypta campanulae (Müller, 1871)
Cecidomyia trachelii Wachtl, 1885
Geocrypta trachelii **(**Wachtl, 1885)
Host: *Campanula rotundifolia* L. (Campanulaceae). References: Baudyš 1940; Skuhravá & Skuhravý 1964. Distribution: European.

Geocrypta galii (Loew, 1850)
Host: *Galium aparine* L., *G. mollugo* L., *G. lucidum* (Rubiaceae). References: Baudyš 1928, 1940; Skuhravá & Skuhravý 1964; Janežić 1988. Locality: Tjentište. Distribution: Euro-Siberian.

Geocrypta heterophylli (Rübsaamen,1914)
Host: *Lathyrus heterophyllus* L., *L. sylvestris* L. (Fabaceae). References: Baudyš 1928, 1940; Skuhravá & Skuhravý 1964. Distribution: European.

Harmandiola cavernosa (Rübsaamen, 1899)
Host: *Populus alba* L. (Salicaceae). References: Baudyš 1915, 1928, 1940; Skuhravá & Skuhravý 1964. Distribution: Euro-Siberian.

Harmandiola globuli (Rübsaamen, 1889)
Host: *Populus tremula* L. (Salicaceae). References: Baudyš 1915; 1928, Skuhravá & Skuhravý 1964. Localities: Dragoš Sedlo (Tjentište), Gradiška, Ilidja. Distribution: Euro-Siberian.

****Harmandiola tremulae*** (Winnertz, 1853)
Diplosis loewii Rübsaamen, 1892
Harmandia loewii (Rübsaamen, 1892)
Host: *Populus alba* L., *P. tremula* L. (Salicaceae). Localities: Donje Bare, Dragoš Sedlo, Gradiška, Krupa, Makljan (Prozor), Suha (Tjentište). Distribution: Euro-Siberian.

Hartigiola annulipes (Hartig, 1839)
Host: *Fagus sylvatica* L. (Fagaceae). References: Baudyš 1915, 1928; Skuhravá & Skuhravý 1964; Janežićic 1988. Localities: Donje Bare, Krupa, Makljan (Prozor), Suha (Tjentište). Distribution: European.

Iteomyia capreae (Winnertz, 1853)
Host: *Salix caprea* L. (Salicaceae). References: Baudyš 1915, 1928, 1940; Skuhravá & Skuhravý 1964; Janežić 1988. Locality: Donje Bare. Distribution: Euro-Siberian.

Jaapiella genisticola (F. Löw, 1877)
Host: *Genista tinctoria* L. (Fabaceae). References: Baudyš 1940; Skuhravá & Skuhravý 1964. Distribution: Euro-Siberian.

****Jaapiella jaapiana*** (Rübsaamen, 1914)
Host: *Medicago lupulina* L. (Fabaceae). Locality: Bjelina. Distribution: European.

Jaapiella medicaginis (Rübsaamen, 1912)
Host: *Medicago sativa* L. (Fabaceae). Localities: Banja Luka, Bjelina. Distribution: Euro-Siberian. Potential pest.

Jaapiella veronicae (Vallot, 1827)
Host: *Veronica chamaedrys* L. (Scrophulariaceae). References: Baudyš 1915, 1928, 1940; Skuhravá & Skuhravý 1964; Janežić 1987, 1988. Localities: Crnići, Prozor, Tjentište. Distribution: European.

Janetia cerris (Kollar, 1850)
Host: *Quercus cerris* L., *Q. macedonica* DC (Fagaceae). References: Baudyš 1915, 1928, 1940; Skuhravá & Skuhravý 1964; Janežić 1987, 1988. Localiteies: Jablanica, Laktaši, Prozor, Poplat (Stolac). Distribution: Mediterranean; widely spread and very common.

Janetia homocera (F. Löw, 1877)
Host: *Quercus cerris* L., *Q. macedonica* DC (Fagaceae). References: Baudyš 1915, 1940; Skuhravá & Skuhravý 1964. Locality: Jablanica. Distribution: Mediterranean.

Janetia nervicola (Kieffer, 1909)
Host: *Quercus cerris* L., *Q. macedonica* DC (Fagaceae). References: Baudyš 1940; Skuhravá & Skuhravý 1964. Localities: Bileća, Jablanica, Poplat (Stolac). Distribution: Mediterranean.

Janetia pustularis (Kieffer, 1909)
Host: *Quercus cerris* L., *Q. macedonica* DC (Fagaceae). References: Baudyš 1915, 1940; Skuhravá & Skuhravý 1964; Janežić 1988. Distribution: Mediterranean.

Janetia szepligetii Kieffer, 1896
Host: *Quercus cerris* L., *Q. macedonica* DC (Fagaceae). References: Baudyš 1940; Skuhravá & Skuhravý 1964; Janežić 1987. Distribution: Mediterranean.

Janetiella lemeei (Kieffer, 1904)
Host: *Ulmus minor* Mill. (Ulmaceae). References: Baudyš 1940; Skuhravá & Skuhravý 1964; Janežić 1987. Distribution: European.

Janetiella thymi (Kieffer, 1888)
Host: *Thymus serpyllum* L. (Lamiaceae). Localities: Mostar, Neum, Prozor, Tjentište. Distribution: Euro-Siberian.

Kaltenbachiola strobi (Winnertz, 1853)
Host: *Picea abies* (L.) Karsten (Pinaceae). Reference: Popo 1977. Distribution: Euro-Siberian.

Kiefferia pericarpiicola (Bremi, 1847)
Cecidomyia pimpinellae Loew, 1850
Host: *Pastinaca sativa* L., *Pimpinella major* (L.) Huds., *Daucus carota* L. (Apiaceae). Reference: Baudyš 1928, 1940; Janežić 1987. Localities: Banja Luka, Bjelina, Sarajevo. Distribution: Euro-Siberian. Potential pest.

Lasioptera carophila F. Löw, 1874
Host: *Daucus carota* L., *Pastinaca sativa* L., *Pimpinella major* (L.) Huds. (Apiaceae). References: Baudyš 1928, Janežić 1987, 1988. Localities: Banja Luka, Bjelina. Distribution: European.

Lasioptera eryngii (Vallot, 1829)
Host: *Eryngium campestre* L., *E. amethystinum* L. (Apiaceae). References: Baudyš 1940; Skuhravá & Skuhravý 1964. Distribution: sub-Mediterranean.

Lasioptera populnea Wachtl, 1883
Host: *Populus alba* L. (Salicaceae). References: Baudyš 1928, 1940; Skuhravá & Skuhravý 1964. Distribution: European.

Lasioptera rubi (Schrank, 1803)
Host: *Rubus caesius* L., *R. idaeus* L. (Rosaceae). Reference: Janežić 1988. Localities: Bjelina, Igman, Tjentište, Vrbas. Distribution: Euro-Siberian. Potential pest.

Lestremia leucophaea (Meigen, 1818) (subfamily Lestremiinae)
Biology unknown, larvae probably phytosaprofagous. References: Strobl 1893, 1898, 1902, 1904. Distribution: Holarctic.

Loewiola centaureae (F. Löw, 1875)
Host: *Centaurea jacea* L., *C. scabiosa* L. (Asteraceae). References: Baudyš 1915; Skuhravá & Skuhravý 1964. Localities: Gradiška, Jablanica. Distribution: European.

Macrodiplosis pustularis (Bremi, 1847)
Diplosis dryobia F. Löw, 1877
Host: *Quercus robur* L., *Q. petraea* (Matt.) Liebl., *Q. cerris* L., *Q. pubescens* Willd., *Q. conferta* Kit. (Fagaceae). References: Baudyš 1915, 1928, 1940; Skuhravá & Skuhravý 1964. Localities: Hromolj, Srpski Brod, Tjentište. Distribution: European.

Macrodiplosis roboris (Hardy, 1854)
Macrodiplosis volvens Kieffer, 1895
Host: *Quercus robur* L., *Q. petraea* (Matt.) Liebl., *Q. pubescens* Willd. (*Q. lanuginosa* Lam.), *Q. conferta Kit*., Q. *cerris* L. (Fagaceae). References: Baudyš 1915, 1928, 1940; Skuhravá & Skuhravý 1964. Localities: Hromolj, Novi Travnik, Trtsteno. Distribution: European.

Macrolabis hieracii Rübsaamen, 1917
Host: *Heracleum sphondylium* L. (Apiaceae). Reference: Janežić 1988. Distribution: Euro-Siberian.

Macrolabis brunellae Tavares, 1907
Host: *Prunella vulgaris* L. (Lamiaceae). Reference: Baudyš 1928; Skuhravá & Skuhravý 1964. Distribution: European.

****Massalongia rubra*** (Kieffer, 1890)
Host: *Betula pendula* Roth. (Betulaceae). Locality: Tjentište. Distribution: European.

Mayetiola graminis (Fourcroy, 1785)
Cecidomyia poae Bosc,1817
Host: *Poa nemoralis* L. (Poaceae). References: Baudyš 1915, 1940; Skuhravá & Skuhravý 1964. Distribution: European.

Mikiola fagi (Hartig, 1839)
Host: *Fagus sylvatica* L., *F. moesiaca* (Domin, Maly) Czeczott (Fagaceae). References: Baudyš 1915, 1928, 1940; Skuhravá & Skuhravý 1964; Janežić 1988. Localities: Banja Luka, Bosanski Petrovac, Crvljivica, Donje Bare, Dragoš Sedlo (Tjentište), Drvar, Krupa, Kupres, Makljan (Prozor), Mrkonjic grad, Novi Travnik, Peručac, Suha, Zela Gora. Distribution: European. Potential pest.

Mikomya coryli (Kieffer, 1901)
Host: *Corylus avellana* L. (Corylaceae). Reference: Janežić 1987, 1988. Distribution: European.

Monarthropalpus flavus (Schrank, 1776)
Cecidomyia buxi Laboulbéne, 1873
Host: *Buxus sempervirens* L. (Buxaceae). Reference: Janežić: 1987, 1988. Localities: Banja Luka, Mostar, Prijedor, Sarajevo. Distribution: European, secondarily Holarctic.

Myricomya mediterranea (F. Löw, 1885)
Host: *Erica arborea* L. (Ericaceae). References: Baudyš 1940; Skuhravá & Skuhravý 1964. Distribution: Mediterranean.

Neomikiella beckiana (Mik,1885)
Host: *Inula conyza* DC. (Asteraceae). References: Baudyš 1915; Skuhravá & Skuhravý 1964. Distribution: European.

Neomikiella lychnidis (Vallot, 1827)
Cecidomyia lychnidis Heyden, 1861
Host: *Silene* (*Melandrium*) *album* (Mill.) Garcke, *S. otites* (L.) Sm. (Caryophyllaceae). References: Baudyš 1940; Skuhravá & Skuhravý 1964; Janežić 1988. Distribution: sub-Mediterranean.

Oligotrophus juniperinus (Linnaeus, 1758)
Host: *Juniperus communis* L. (Cupressaceae). References: Baudyš 1940; Skuhravá & Skuhravý 1964; Janežić 1988. Locality: Prijevor (Tjentište). Distribution: European.

****Oligotrophus panteli*** Kieffer, 1898
Host: *Juniperus communis* L. (Cupressaceae). Locality: Prijevor (Tjentište). Distribution: European.

Oligotrophus schmidti Rübsaamen, 1914
Host: *Juniperus communis* L. (Cupressaceae). Reference: Janežić 1988. Distribution: European.

Ozirhincus tanaceti (Kieffer, 1889)
Clinorrhyncha tanaceti Kieffer, 1889
Host: *Tanacetum vulgare* L. (Asteraceae). Reference: Janežić 1988. Distribution: Euro-Siberian.

Phegomyia fagicola (Kieffer, 1901)
Host: *Fagus sylvatica* L. (Fagaceae). References: Baudyš 1915, 1940; Skuhravá & Skuhravý 1964. Distribution: European.

Physemocecis hartigi (Liebel, 1892)
Host: *Tilia cordata* Mill., *T. platyphyllos* Scop. (Tiliaceae). References: Baudyš 1928, 1940; Skuhravá & Skuhravý 1964. Localities: Igman, Suha (Tjentište). Distribution: European.

Physemocecis ulmi (Kieffer, 1909)
Host: *Ulmus minor* L. (Ulmaceae). References: Baudyš 1940; Skuhravá & Skuhravý 1964. Distribution: European.

Placochela ligustri Rübsaamen, 1899
Host: *Ligustrum vulgare* L. (Oleaceae). Reference: Janežić 1987. Distribution: European.

Planetella gallarum (Rübsaamen, 1899)
Dichrona gallarum Rübsaamen, 1899
Host: *Carex sp.* (Cyperaceae). References: Baudyš 1915; Skuhravá & Skuhravý 1964. Distribution: European.

Plemeliella abietina Seitner, 1908
Host: *Picea abies* (L.) Karsten (Pinaceae). Reference: Popo 1977. Distribution: European.

Polystepha malpighii (Kieffer, 1909)
Perrisia malpighii Kieffer, 1909
Dasineura malpighii (Kieffer, 1909)
Host: *Q. petraea* (Mattusch.) Liebl. (Fagaceae). References: Baudyš 1928, 1940; Skuhravá & Skuhravý 1964. Distribution: European.

Putoniella pruni (Kaltenbach, 1872)
Diplosis marsupialis Löw, 1889
Host: *Prunus domestica* L., *P. spinosa* L. (Rosaceae). References: Baudyš 1940; Skuhravá & Skuhravý 1964. Localities: Bjelina, Brčko, Stara Bila, Srpski Brod, Tjentište, Vršani (Bjelina). Distribution: European. Pest.

Rabdophaga clavifex (Kieffer, 1891)
Host: *Salix caprea* L., *S. aurita* L. (Salicaceae). References: Baudyš 1940; Skuhravá & Skuhravý 1964. Distribution: Euro-Siberian.

Rabdophaga heterobia (Loew, 1850)
Host: *Salix* sp. (Salicaceae). References: Baudyš 1915; Skuhravá & Skuhravý 1964. Distribution: Euro-Siberian.

Rabdophaga iteobia (Kieffer, 1890)
Host: *Salix caprea* L., *S. aurita* L. (Salicaceae). References: Baudyš 1915; Skuhravá & Skuhravý 1964; Janežić 1987, 1988. Distribution: Euro-Siberian.

Rabdophaga marginemtorquens (Bremi, 1847)
Cecidomyia marginemtorquens Bremi, 1847
Dasineura marginemtorquens (Bremi, 1847)
Host: *Salix alba* L., *S. viminalis* L. (Salicaceae). References: Baudyš 1915; Skuhravá & Skuhravý 1964. Localities: Ilidja, Laktaši. Distribution: Euro-Siberian.

Rabdophaga nervorum (Kieffer, 1895)
Host: *Salix incana* Schrank (Salicaceae). Reference: Baudyš 1928, Skuhravá & Skuhravý 1964. Distribution: European.

Rabdophaga pierreana (Kieffer, 1909)
Host: *Salix aurita* L. (Salicaceae). References: Baudyš 1940; Skuhravá & Skuhravý 1964. Distribution: European.

Rabdophaga pulvini (Kieffer, 1891)
Bertieria rosariella Kieffer, 1896
Host: *Salix incana* Schrank (Salicaceae). Reference: Baudyš 1928. Distribution: European.

Rabdophaga rosaria (Loew, 1850)
Host: *Salix alba* L., *S. cinerea* L., *S. incana* Schrank, *S. purpurea* L. (Salicaceae). References: Baudyš 1915, 1928, 1940; Skuhravá & Skuhravý 1964. Localities: Prijedor, Sanski Most. Distribution: Euro-Siberian.

Rabdophaga saliciperda (Dufour, 1841)
Host: *Salix alba* L., *S. fragilis* L., *S. coerulea* L. (Salicaceae). References: Baudyš 1915; Skuhravá & Skuhravý 1964; Živojinović et al. 1962. Distribution: Euro-Siberian.

Rabdophaga salicis (Schrank, 1803)
Host: *Salix cinerea* L. (Salicaceae). Localities: Doboj, Gradiška, Sanski Most, Zvornik. Distribution: Euro-Siberian.

Rabdophaga terminalis (Loew, 1850)
Host: *Salix alba* L., *S. fragilis* L., *S. incana* Schrank, *S. triandra* L., *S. viridis* Fries, *S. purpurea* L. (Salicaceae). References: Baudyš 1915, 1928, 1940; Skuhravá & Skuhravý 1964; Janežić 1987, 1988. Localities: Šamac, Zvornik. Distribution: Euro-Siberian.

Resseliella piceae Seitner, 1906
Host: *Abies alba* Mill. and *A. pectinata* DC. (Pinaceae). Reference: Popo 1977. Distribution: European.

Rhopalomyia baccarum (Wachtl, 1883)
Host: *Artemisia vulgaris* L. (Asteraceae). References: Baudyš 1915; Skuhravá & Skuhravý 1964. Distribution: Euro--Siberian.

Rhopalomyia foliorum (Loew, 1850)
Host: *Artemisia vulgaris* L. (Asteraceae). Reference: Janežić 1988. Distribution: Euro-Siberian.

Rhopalomyia millefolii (Loew,1850)
Host: *Achilea millefolium* L. (Asteraceae). References: Baudyš 1915, 1940; Skuhravá & Skuhravý 1964. Localities: Doboj, Zvornik. Distribution: Euro-Siberian and Asian.

Rhopalomyia kiefferi Trotter, 1900
Host: *Artemisia camphorata* Vill. (Asteraceae). References: Baudyš 1915; Skuhravá & Skuhravý 1964. Distribution: Mediterranean.

Rondaniola bursaria (Bremi, 1847)
Host: *Glechoma hederacea* L. (Lamiaceae). Reference: Janežić 1988. Locality: Ilidja. Distribution: European.

Sackenomyia reaumurii (Bremi, 1847)
Oligotrophus solmsi Kieffer, 1906
Phlyctidobia solmsi (Kieffer, 1906)
Host: *Viburnum lantana* L., *V. maculata* Pant. (Caprifoliaceae). References: Baudyš 1928, 1940; Skuhravá & Skuhravý 1964; Janežić 1987, 1988. Localities: Igman, Kaonik. Distribution: European.

Schizomyia galiorum Kieffer, 1889
Host: *Galium aparine* L. (Rubiaceae). Reference: Baudyš 1928. Locality: Bjelina. Distribution: Euro-Siberian.

Semudobia betulae (Winnertz, 1853)
Host: *Betula pendula* Roth. (Betulaceae). References: Janežić 1988; Simova-Tošič et al. 1982.
Distribution: Euro-Siberian – Holarctic.

Semudobia skuhravae Roskam, 1977
Host: *Betula pendula* Roth. (Betulaceae). References: Janežić 1988; Simova-Tošič et al. 1982.
Distribution: Euro-Siberian.

Semudobia tarda Roskam, 1977
Host: *Betula pendula* Roth. (Betulaceae). Reference: Janežić 1988; Simova-Tošič et al. 1982.
Distribution: Euro-Siberian.

Sitodiplosis mosellana (Géhin, 1856)
Host: *Triticum vulgare* L. (Poaceae). Localities: Bjelina, Prijedor. Distribution: European, secondarily Holarctic. Potential pest.

Spurgia euphorbiae (Vallot, 1827)
Cecidomyia capitigena Bremi, 1847
Cecidomyia subpatula Bremi, 1847
Bayeria capitigena (Bremi, 1847)
Host: *Euphorbia cyparissias* L. (Euphorbiaceae). References: Baudyš 1928, 1940; Skuhravá & Skuhravý 1964; Janežić 1987. Localities: Banja Luka, Bjelina, Ilidja, Laktaši, Prijedor. Distribution: European.

Tricholaba trifolii Rübsaamen, 1917
Host: larvae are inquilines in the galls of *Dasineura trifolii* (F.Low) on *Trifolium pratense* L. Reference: Janežić 1987. Distribution: Euro-Siberian.

Wachtliella ericina (F. Löw, 1885)
Host: *Erica carnea* L., *E. arborea* L. (Ericaceae). References: Hieronymus 1890; Baudyš 1915, 1928, 1940; Skuhravá & Skuhravý 1964. Distribution: sub-Mediterranean.

Wachtliella persicariae (Linne, 1767)
Host: *Polygonum amphibium L.*, *P. persicariae L.* (Polygonaceae). References: Baudyš 1940; Skuhravá & Skuhravý 1964. Distribution: European.

Wachtliella stachydis (Bremi, 1847)
Host : *Stachys sylvatica* L., *S. recta* L. (Lamiaceae). References: Baudyš 1915, 1940; Skuhravá & Skuhravý 1964. Distribution: European.

****Zeuxidiplosis giardi*** (Kieffer, 1896)
Host: *Hypericum perforatum* L. (Hypericaceae). Localities: Prozor, Prijedor, Tjentište. Distribution: European, secondarily Holarctic.

Zygiobia carpini (F. Löw, 1874)
Host: *Carpinus betulus* L. (Corylaceae). References: Baudyš 1915, 1928, 1940; Skuhravá & Skuhravý 1964. Localitieas: Mostar, Pale, Tjentište. Distribution: European.

EVALUATION OF RESULTS

Number of species forming the present fauna

The present fauna of Bosnia and Hercegovina includes 169 species. Of them, the following 28 are new records for Bosnia and Hercegovina, viz. *Ametrodiplosis urticae*, *Clinodiplosis oleracei*, *C. socialis*, *Contarinia loti*, *C. lepidii*, *C. sambuci*, *C. tritici*, *Craneiobia corni*, *Cystiphora taraxaci*, *Dasineura acrophila*, *D. capsulae*, *D. hyperici*, *D. lathyri*, *D. lupulinae*, *D. mali*, *D. napi* (= *D. brassicae*), *D. oleae*, *D. pteridicola*, *Feltiella tetranychi*, *Harmandiola tremulae*, *Jaapiella jaapiana*, *J. medicaginis*, *Janetiella thymi*, *Massalongia rubra*, *Oligotrophus panteli*, *Rabdophaga salicis*, *Sitodiplosis mosellana* and *Zeuxidiplosis giardi*.

Of 169 gall midge species forming the fauna, most species are phytophagous, only two species, viz. *Feltiella tetranychi* and *Aphidoletes aphidimyza*, are zoophagous and other two species, viz. *Lestremia leucophaea* and *Claspettomyia chrysanthemi*, are phytosaprophagous.

In general, the level of knowledge of the gall midge fauna of Bosnia and Hercegovina including 169 species may be evaluated as rather good known in comparison with gall midge faunas of adjacent countries. It is a little poorer than the gall midge fauna of Slovenia including 219 species (Simova-Tošić et al. 1996) and of Croatia including 232 species (Simova-Tošić et al. 2004) but it is richer than that of Monte Negro including only 85 species (Simova-Tošić & Skuhravá 2001). A relatively high species number of gall midge fauna of Serbia including 283 species is a result of long–termed investigations of many researchers in that area (Simova-Tošić et al. 2000).

Zoogeography

Gall midges occurring in Bosnia and Hercegovina may be divided, according to their overall distribution, into several groups: European, Euro-Siberian, Mediterranean and sub-Mediterranean and Holarctic or cosmopolitan (Skuhravá 1997).

Of all 169 gall midge species forming the fauna of Bosnia and Hercegovina, 85 species (50%) belong to European. They have their centres of origin in Europe. Their areas may range from very small to large. Typical representatives of European species with large distribution areas are *Mikiola fagi* and *Hartigiola annulipes* associated with *Fagus sylvatica*, *Macrodiplosis pustularis* and *M. roboris* with *Quercus robur* and other *Quercus* spp. and *Zygiobia carpini* with *Carpinus betulus*. These species occur mainly in mountainous parts of Bosnia and Hercegovina.

Fifty species (29%) may be regarded as Euro-Siberian. They occur in Europe, extending at least to Western Siberia, and a few species reach up to the most eastern part of the Palaearctic

Region. Typical representatives of Euro-Siberian species occurring in Bosnia and Hercegovina are *Harmandiola cavernosa* and *H. tremulae* associated with *Populus tremula*, *Lasioptera rubi* with *Rubus* spp. and *Iteomyia capreae* and species of the genus *Rabdophaga* associated with various species of the genus *Salix*.

Twenty three species (14%) may be considered to be Mediterranean or sub-Mediterranean. The true Mediterranean species are associated with Mediterranean host plant species and occur in areas along the coast or near the coast of the Adriatic Sea. The sub-Mediterranean species have larger distribution areas and may reach up to Central Europe where they usually reach the northern boundary of their distribution area, as for example *Lasioptera eryngii* with *Eryngium*, *Asphondylia verbasci* with *Verbascum* spp. The following species are typical representatives of the Mediterranean fauna occurring in Bosnia and Hercegovina: *Myricomyia mediterranea* associated with *Erica arborea*; *Dasineura oleae* associated with *Olea europaea*; *Asphondylia coronillae* with *Coronilla emerus*; *Asphondylia calycotomae* with *Calicotome intermedia*; *Contarinia luteola* with *Quercus ilex*; *Janetia cerris*, *J. homocera*, *J. nervicola*, *J. pustularis*, *J. szepligetii*, *Dryomyia circinans*, *Dasineura tubularis*, *Contarinia quercicola* and *C. subulifex* with *Quercus cerris*. Mediterrranean species occur mainly along the western boundary of Bosnia and Hercegovina.

Eleven species have Holarctic distributions, occurring in Europe and in North America. Most of them are species of European origin which have been transported to North America with agricultural or forest materials. *Contarinia tritici* and *Sitodiplosis mosellana* associated with cereals, *Dasineura mali* and *Dasineura pyri* associated with fruit trees and *Monarthropalpus flavus* developing on ornamental shrub *Buxus sempervirens* are primarily European species which were transported to North America and have now a the Holarctic type of distribution. Some of them were imported to other zoogeographical regions and now have even cosmopolitan distributions. *Aphidoletes aphidimyza*, larvae of which are predators of aphids, is such a species with a cosmopolitan distribution. *Lestremia leucophaea*, the member of the subfamily Lestremiinae, has a true Holarctic distribution.

Economic importance

According to published informations and personal contacts of the first author with collegues from Bosnia and Hercegovina, till now there was not reported any significant damage caused by gall midges larvae of which are known to be harmful to cultivated plants in adjacent countries. That is the similar situation as in Slovenia where any species were mentioned to be a pest on cultivated plants in the past (Simova-Tošić et al.1996).

In Bosnia and Hercegovina only two species occurred at higher levels. *Contarina medicaginis* appeared in large density in Bosanska Krajina in 1956 when up to 48 % flower buds of alfalfa (*Medicago sativa*) were attacked. In the next year (1957) this species was abundant in the whole country but it caused some damages mainly in the surroundings of Banja Luka, Bihac and Novi Travnik.

Dasineura pyri larvae of which attack young leaves of pear (*Pyrus communis*) occurred in larger amount in last time but the levels were not too hight and it was not necessary to do any control (personal comm.). This species is the only one pest of the family Cecidomyiidae known in adjacent areas of Montenegro (Simova-Tošić & Skuhravá 2001).

It is necessary to consider gall midge species which occurred as pests of cultivated plants in adjacent areas, in Croatia and Serbia, as potential pests in Bosnia and Hercegovina. There are the following species: *Asphondylia miki*, *A. pruniperda*, *Contarinia medicaginis*, *C. nasturtii*, *Dasineura mali*, *D. napi* (=*D. brassicae*), *D. oleae*, *D. pyri*, *D. tortrix*, *Jaapiella medicaginis*, *Kiefferia pericarpiicola*, *Lasioptera rubi* and *Putoniella pruni*.

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Gall midges (Diptera: Cecidomyiidae) of Macedonia

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Abstract. The present fauna of gall midges of Macedonia includes 147 species. Of them, 68 are new records for Macedonia; they are indicated with asterisk (*) in the list. Zoogeography: the majority (57%) are European, 30% Euro-Siberian, 12% Mediterranean and sub-Mediterranean and 1% are Holarctic species. Economic importance: *Apiomyia bergenstammi* (Wachtl, 1882), *Asphondylia miki* Wachtl, 1880, *A. pruniperda* Rondani, 1867, *Contarinia medicaginis* Kieffer, 1895, *C. pyrivora* (Riley, 1886), *Dasineura medicaginis* (Bremi, 1847), *D. pyri* (Bouché, 1847), *D. tortrix* (F. Löw, 1877), *Lasioptera rubi* (Schrank, 1803), *Monartropalpus flavus* (Schrank, 1776) and *Putoniella pruni* (Kaltenbach, 1872) are pests of cultivated plants. The annotated list of all gall midge species occurring in Macedonia, together with host plant species, references, new localities and distribution, is given.

Distribution, zoogeography, plant-insect interactions, economic importance, check-list, Diptera, Cecidomyiidae, Balkan peninsula, Macedonia, Palaearctic region

INTRODUCTION

This article is a continuation of a series devoted to gall midge faunas of countries of the Balkan peninsula of which the first was on gall midges of Slovenia (Simova-Tošić et al. 1996), then of Serbia (Simova-Tošić et al. 2000), of Monte Negro (Simova-Tošić & Skuhravá 2001), of Croatia (Simova-Tošić et al. 2004) and of Bosnia and Hercegovina (Simova-Tošić et al. 2005). In the present article we summarize results of investigations of gall midges in the Republic of Macedonia obtained during the 20th century and bring many new records.

In Macedonia the first two gall midge species, viz. *Stefaniella brevipalpis*, the causer of galls on *Atriplex portulacoides*, and *Baldratia salicorniae*, the causer of galls on *Salicornia herbacea*, were found by the Italian entomologist A. Trotter (1903) during his research journey across the Balkan peninsula to Turkey. The Czech phytopathologist E. Baudyš, who investigated occurrence of galls on various plants during his stay in Balkan peninsula and identified galls collected by other researches, mentioned galls of seven gall midge species that were found in Macedonia by K. Vandas in 1922 (Baudyš 1928, 1940).

A. Jurilj collected galls (zoo- and phytocecidia) in Macedonia during the period 1938–1940 and gathered 120 galls of various causers of which a part was identified by G. Moesz of the Hungarian National Museum. Results were published after the second world war (Jurilj 1948). The collection of galls is now preserved at the Institute of Botany, Faculty of Agriculture, Zagreb. Of all, 22 galls are caused by gall midges. Three gall midge galls were only described but not identified. We identified them on the basis of the description of the shape of galls as *Paradiplosis diplosispectinatae* on needles of *Abies alba*, *Geocrypta galii* on *Galium* sp. and *Rabdophaga clavifex* on *Salix* sp.

Karaman (1960) found a mass occurrence of galls of *Monarthropalpus flavus* on *Buxus sempervirens* in Skopje and its surrounding. *M. flavus* caused serious damage which was accompanied with early defoliation of attacked shrubs. The Polish entomologist Szadiewski (1975) investigated free living gall midges in Yugoslavia using the method of netting or catching adults in dishes with water. He discovered four species of non-making gall midges in Macedonia. Janežić (1977) collected galls of 39 gall midge species in Macedonia of which 30 were new records for this republic.

D. Simova-Tošić, native of Skopje, contributed importantly to the knowledge of the family Cecidomyiidae in Macedonia. She studied the biology, morphology and occurrence of several gall midge species (Simova-Tošić 1968, 1969, 1971, 1974), recorded *Apiomyia bergenstammi* for the first time in Macedonia (Simova-Tošić & Ančev 1979), studied the occurrence of *Dasineura tetensi* in Macedonia and Serbia and its economic significance (Simova-Tošič & Dobrivojević 1981), investigated gall midges and their parasites in the female birch catkins and found three species of the genus *Semudobia* species in Macedonia (Simova-Tošić et al. 1982) and reported about the mass occurrence of *Monarthropalpus flavus* at many localities of the former Yugoslavia, including Macedonia (Simova-Tošić et al.1985).

Dobrivojević et al. (1981) investigated the biology of *Asphondylia pruniperda* and the intensity of its attack on plum trees in Berovo during 1979–1980.

Postolovski (1988,1989, 1997) studied gall midge species associated with fruit trees, their predators and parasitoids and also the biology of *Torymus apiomyiae*, an ectoparasitoid of *Apiomyia bergenstammi*. Postolovski & Lazarevska (1997) recommended the control measures for harmful agents in orchards and gave a model for integrated pest management in pear orchards as a base for the protection. Among ten harmful insects they mentioned also the gall midge *Dasineura pyri*.

Krsteska et al. (2003) published results of three years investigations on possibility to use the larvae of *Aphidopletes aphidimyza* as a bioregulator of aphids *Myzus persicae* occurring on tobacco plants.

MATERIAL AND METHODS

The list of gall midge species was compiled from all papers of previous researchers dealing with the occurrence of gall midges and their galls in Macedonia. The first author collected gall midge galls at more then fifty localities in Macedonia in the course of about twenty years, in the period 1970–1990. Results of her collections are included in the present study (Fig. 1).

The Republic of Macedonia is situated in the southern part of the Balkan Peninsula and covers 25.713 km ^{2}. In the north, Macedonia is bordered by Serbia, in the east by Bulgaria, in the south by Greece and in the west by Albania. It is a mountainous country, it has 34 mountain peaks exceeding 2.000 metres and 53 natural or artificial lakes. The largest is the Ohrid lake situated at the altitude of 693 m a.s.l. It occupies an area of 349 square kilometres of which a part (118,9 km^2) belongs to Albania. The lake Prespa covers 274 square kilometres of which 49,4 belongs to Albania and 47,8 to Greece. The longest river in Macedonia is Vardar with four large tributaries, viz. Bregalnica, Crna reka, Treska and Pčinja. The last mentioned river divides the country into eastern and western parts. Macedonia has four national parks, viz. Galicica, Mavrovo, Pelister and Jasen, which include a total area of about 110.000 ha. Forests cover about 900.000 ha of the country (about 35 % of the total area). Arable agricultural land extends over some 670.000 ha (27 % of the total area). Macedonia is formed of uplands and plains. The lower mountains are covered with rich vegetation consisting mostly of deciduous and evergreen forests and spacious pastures. There are fertile plains of which the largest parts are Pelagonia, Ovče Pole and Polog. Various climatic zones occur in Macedonia. The estern part and the part including the lower flow of the river Vardar is under influence of the Mediterranean climate. It has warm summers with many sunny days and mild winter. Western and northern areas have temperate-continental climate with more marked seasonal extremes.

From the biogeographical point of view, Macedonia belongs to the Province of Balkan Highlands (Udvardy 1975).

Gall midge galls were identified using keys for identification of Buhr (1964–1965) and Houard (1908–1909), larvae according to Möhn (1955), adults according to Skuhravá (1997a). We analyzed the gall midge fauna using zoogeographical methods of Skuhravá (1987, 1994a,b, 1997b). The economic importance has been evaluated according to Darvas et al. (2000), Skuhravá & Roques (2000) and Skuhravý & Skuhravá (1996). Nomenclature of gall midges is according to Skuhravá (1986, 1989, 1997a) and Gagné (2004), nomenclature of host plants according to Tutin et al. (1964, 1968, 1972, 1976,1980) and Lauber & Wagner (2001).

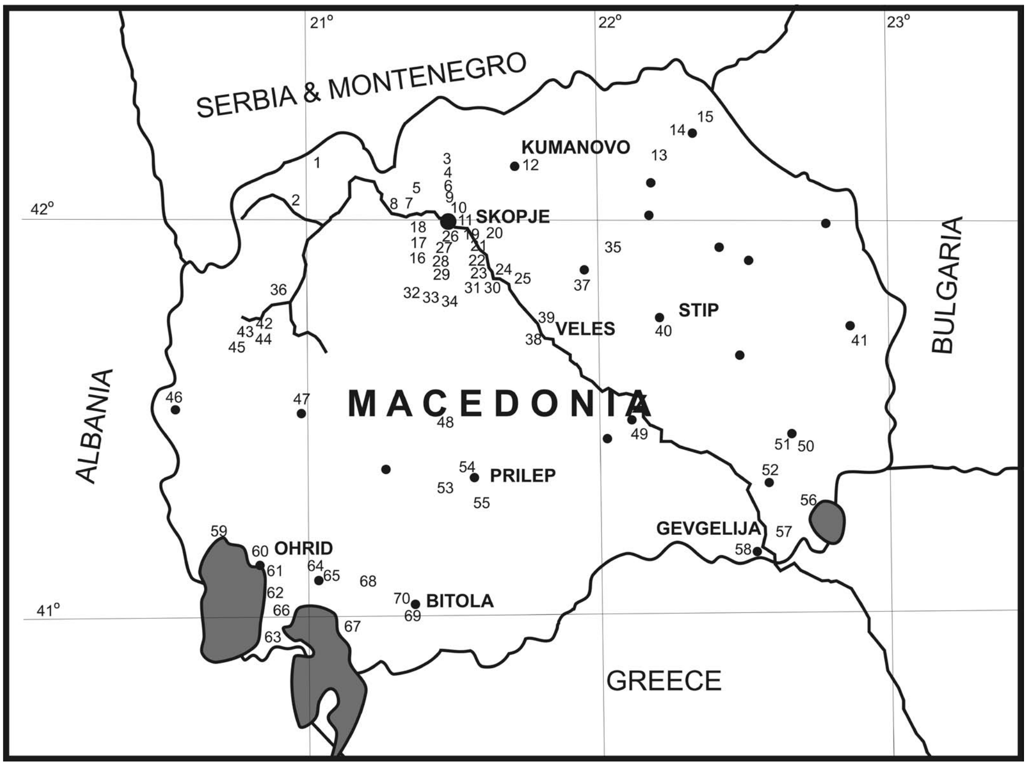

Fig.1. Map of Macedonia with localities where gall midge were collected: 1 – Vratnica, 2 – Tetovo, 3 – Ramno, 4 – Brodec, 5 – Pobozje, 6 – Ljubanci, 7 – Lepenec, 8 – Orman, 9 – Radisani, 10 – Butel, 11 – Skopje, 12 – Kumanovo, 13 – Osogovski planini, 14 – Kriva Palanka, 15 – Osogovski Manastir, 16 – Treska, 17 – Matka, 18 – Saraj, 19 – Skopsko Pole, 20 – Trubarevo, 21 – Gorno Lisice, 22 – Dolno Lisice, 23 – Dracevo, 24 – Petrovec, 25 – Katlanovska Banja, 26 – Vodno, 27 – Gorno Sonje, 28 – Gorno Kolicane, 29 – Markov Manastir, 30 – Zelenikovo, 31 – Dolno Kolicane, 32 – Kitka, 33 – Kadina reka, 34 – Kadino Selo, 35 – Ovce Pole, 36 – Gostivar, 37 – Sveti Nikole, 38 – Veles, 39 – Novo Selo (Veles), 40 – Bregalnica (Stipsko), 41 – Berovo, 42 – Mavrovi anovi, 43 – Radika (Vrbjani), 44 – Mavrovo, 45 – Sveti Jovan Bigorski, 46 – Debar, 47 – Kicevo, 48 – Krusje (Babuna), 49 – Negotino, 50 – Strumica, 51 – Bansko, 52 – Udovo, 53 – Konjari, 54 – Prilep, 55 – Mariovo, 56 – Dojran, 57 – Bogdanci, 58 – Gevgelija, 59 – Struga, 60 – Ohrid, 61 – Biljanini Izovir, 62 – Pestani, 63 – Sveti Naum, 64 – Prespa, 65 – Resen, 66 – Otesevo, 67 – Pretor, 68 – Kazani, 69 – Pelister, 70 – Bitola.

ANNOTATED LIST OF GALL MIDGE SPECIES

For each species the following data are given: host plant (or animal) species, plant family, references to articles of earlier authors with published records on occurrence; unpublished localities where the species was found in the period 1970–1990; distribution in the Palaearctic region according to Skuhravá (1986, 1997b); synonyms and combinations after Skuhravá (1986) and Gagné (2004); for some species the additional data are given about their economic importance (pest, or potential pest). An asterisk (*) before the species name indicates a new record for the fauna of Macedonia.

Acericecis vitrina (Kieffer, 1909)
Syn. *Perrisia vitrina* Kieffer, 1909
Dasineura vitrina (Kieffer, 1909) in Skuhravá (1986)
Host: *Acer pseudoplatanus* L. (Aceraceae). Localities: Ohrid, Sveti Jovan Bigorski. Distribution: European. Potential pest.

Aphidoletes aphidimyza (Rondani, 1847)
Host: Zoofagous on more than 30 aphids species on different plants (Harris 2004). Reference: Simova-Tosić & Vuković 1980; Krsteska et al. 2003. Localities: Gostivar, Tetovo, Skopje. Distribution: Holarctic.

Apiomyia bergenstammi (Wachtl, 1882)
Host: *Pyrus communis* L., *P. amygdaloides* Vill. (Rosaceae). References: Simova-Tosić & Ančev 1979; Postolovski 1988, 1989, 1997; Bouček & Mihajlović 1986. Distribution: sub-Mediterranean. Pest.

Arthrocnodax vitis Rübsaamen, 1895
Host: Zoophagous on *Eriophies vitis* Landois (Eriophyidae, Acari) on *Vitis vinifera L.* (Vitaceae). Localities: Gevgelija, Veles, Vodno. Distribution: European.

Aschistonyx carpinicolus Rübsaamen, 1917
Host: *Carpinus betulus* L. (Corylaceae). Localities: Kadino selo (Kitka). Distribution: European.

Asphondylia cytisi Frauenfeld, 1873
Host: *Cytisus supinus* (L.) Link. (Fabaceae). Localities: Gorno Sonje, Mavrovo, Matka. Distribution: Euro-Siberian.

Asphondylia melanopus Kieffer, 1890
Host: *Lotus corniculatus* L. (Fabaceae). Localities: Dolno Lisiče, Negotino, Orman (near Skopje). Distribution: European. Potential pest.

Asphondylia miki Wachtl, 1880
Host: *Medicago sativa* L. (Fabaceae). Localities: Berovo, Trubarevo (near Skopje). Distribution: Euro-Siberian, secondarily Holarctic. Pest.

Asphondylia ononidis F. Löw, 1873
Host: *Ononis spinosa* L. (Fabaceae). Locality: Zelenikovo. Distribution: European – sub-Mediterrranean.

Asphondylia pruniperda Rondani, 1867
Host: *Prunus domestica* L., *P. spinosa* L., *P. pissardii* Carr., *P. cerasifera* Ehr., *P. purpurea* L. (Rosaceae). References: Dobrivojević et al.1981; Postolovski 1988, 1989. Locality: Berovo. Distribution: European. Pest.

Asphondylia serpylli Kieffer, 1898
Host: *Thymus serpyllum* L. (Lamiaceae).Localities: Brodec (Skopska Crna Gora), Vodno. Distribution: European.

Asphondylia verbasci (Vallot, 1827)
Host: *Verbascum austriacum* Schott., *V. banaticum* Roch., *V. lychnitis* L., *V. nigrum* L., *V. phlomoides* L. (Scrophulariaceae). Reference: Jurilj 1948. Localities: Brodec (Skopska Crna Gora), Butel (near Skopje), Mavrovo, Pretor (Prespa), Saraj, Vodno. Distribution: sub-Mediterranean.

Baldratia salicorniae Kieffer, 1897
Host: *Salicornia fructicosa* L. (Chenopodiaceae). Reference: Trotter 1903. Distribution: Mediterranean.

Bayeriola thymicola (Kieffer, 1888)
Host: *Thymus serpyllum* L. (Lamiaceae). Localities: Brodec (Skopska Crna Gora), Mavrovo. Distribution: European.

Bryocrypta maculata Mamaev, 1966
Biology unknown. Adults were caught. Reference: Szadziewski 1975. Distribution: European.

Clinodiplois cilicrus (Kieffer, 1888)
Host: *Centaurea scabiosa* L. (Asteraceae). Localities: Bogdanci (near Gevgelia), Negotino. Distribution: Euro-Siberian.

Contarinia acerplicans (Kieffer, 1889)
Host: *Acer pseudoplatanus* L. (Aceraceae). Reference: Janežić 1977. Distribution: European.

Contarinia ballotae Kieffer, 1898
Host: *Ballota nigra* L. (Lamiaceae). Localities: Mavrovo, Matka. Distribution: European.

Contarinia coryli (Kaltenbach, 1859)
Host: *Corylus avellana* L. (Corylaceae). Reference: Janežić 1977 (as *Contarinia corylina* Lw.); Postolovski 1988. Locality: Berovo. Distribution: Euro-Siberian.

Contarinia craccae (Loew, 1850)
Syn. *Contarinia craccae* Kieffer, 1897
Host: *Vicia cracca* L., *V. sativa* L. (Fabaceae). Localities: Bansko (near Strumica), Berovo. Distribution: Euro-Siberian.

Contarinia helianthemi (Hardy, 1850)
Host: *Helianthemum nummularium* (L.) Run. (Cistaceae). Localities: Mavrovo, Strumica. Distribution: European.

Contarinia lathyri Kieffer, 1909
Host: *Lathyrus pratensis* L. (Fabaceae). Localities: Negotino, Skopsko Pole. Distribution: European.

Contarinia lepidii Kieffer, 1909
Host: *Lepidium draba* L. (Brassicaceae). Localities: Lisiče (near Skopje), Radišani. Distribution: European.

Contarinia lonicerae Kieffer, 1909
Host: *Lonicera nigra* L. (Caprifoliaceae). Localities: Boganci, Resen. Distribution: European.

Contarinia loti (De Geer, 1776)
Host: *Lotus corniculatus* L. (Fabaceae). Localities: Skopje, Petrovec. Distribution: European.

Contarinia medicaginis Kieffer, 1895
Host: *Medicago sativa* L. (Fabaceae). References: Localities: Berovo, Strumica, Skopsko. Distribution: Euro-Siberian. Pest.

Contarinia melanocera Kieffer, 1904
Host: *Genista depressa* M.B. (Fabaceae). Reference: Baudyš 1928. Distribution: European.

Contarinia nasturtii (Kieffer, 1888)
Host: *Brassica* spp., *Raphanus* spp. (Brassicaceae). Localities: Debar, Gostivar, Skopje. Distribution: European. Potential pest.

Contarinia petioli (Kieffer, 1898)
Host: *Populus alba* L. (Salicaceae). Localities: Ljubance (Skopska Crna Gora), Markov Manastir. Distribution: Euro-Siberian.

Contarinia pisi (Loew, 1850)
Syn. *Cecidomyia pisi* Winnertz, 1854
Host: *Pisum sativum* L. (Fabaceae). Localities: Lisiče, Skopje, Tetovo. Distribution: Euro-Siberian. Potential pest.

Contarinia pyrivora (Riley, 1886)
Host: *Pyrus communis* L. *P. amygdaliformis* Vill. (Rosaceae). Reference: Postolovski 1988, 1989. Distribution: European, secondarily Holarctic. Pest.

Contarinia quercicola (Rübsaamen, 1899)
Host: *Quercus cerris* L. (Fagaceae). References: Janežić 1977 (as *Syndiplosis quercicola* Rübs.). Distribution: Mediterranean.

Contarinia rumicis (Loew, 1850)
Host: *Rumex acetosella* (L.) (Polygonaceae). Locality: Saraj (near Skopje). Distribution: European, secondarily Holarctic.

****Contarinia sambuci*** (Kaltenbach, 1873)
Host: *Sambucus ebulus* L. (Caprifoliaceae). Localities: Brodec (Skopska Crna Gora), Manstir Sveti Ilija. Distribution: Euopean.

Contarinia solani (Rübsaamen, 1891)
Host: *Solanum dulcamara* L. (Solanaceae). Localities: Ljubance, Pobožje (Skopska Crna Gora). Distribution: European.

Contarinia subulifex Kieffer, 1897
Host: *Quercus cerris* L., *Q. macedonica* L. (Fagaceae). References: Jurilj 1948; Janežić 1977. Distribution: Mediterranean.

Contarinia tiliarum (Kieffer, 1890)
Host: *Tilia cordata* Mill., *T. platyphyllos* Scop. (Tiliaceae). Localities: Ohrid, Skopski park. Distribution: Euro-Siberian.

Contarinia tremulae Kieffer, 1909
Host: *Populus tremula* L. (Salicaceae). Localities: Saraj (near Skopje), Skopski park. Distribution: European.

Craneiobia corni (Giraud, 1863)
Host: *Cornus sanguinea* L. and *C. mas* L. (Cornaceae). References: Jurilj 1948; Janezić 1977. Localities: Mavrovo, Pelister, Sv. Jovan Bigorski. Distribution: sub-Mediterranean.

Cystiphora sonchi (Vallot, 1827)
Syn. *Cecidomyia sonchi* Bremi, 1847
Host: *Sonchus arvensis* L. (Asteraceae). Localities: Mavrovo, Pretor (Prespa lake), Resen. Distribution: Euro-Siberian.

Cystiphora taraxaci (Kieffer, 1888)
Host: *Taraxacum officinale* Web. (Asteraceae). Localities: Bogdanci, Dojran, Mavrovo, Pretor, Skopje, Tetovo. Distribution: Euro-Siberian.

Dasineura affinis (Kieffer, 1886)
Host: *Viola odorata* L. (Violaceae). Localities: Oteševo (Prespa lake), Pretor, Pelister, Skopje. Distribution: European.

Dasineura aparines (Kieffer, 1889)
Host: *Galium aparine* L. (Rubiaceae). Localities: Berovo, Dračevo (near Scopje), Orman, Saraj. Distribution: European.

Dasineura capsulae (Kieffer, 1901)
Host: *Euphorbia cyparissias* L., *E. virgata* W.K., *E. esula* L. (Euphorbiaceae). Localities: Berovo, Mavrovo, Negotino. Distribution: European.

Dasineura corylina (Kieffer, 1913)
Host: Inquiline in the galls of *Contarinia coryli* (Kaltenbach). Reference: Jurilj 1948. Distribution: European.

Dasineura crataegi (Winnertz, 1853)
Host: *Crataegus monogyna* Jacq., *C. oxyacantha* L. (Rosaceae). References: Jurilj 1948; Janežić 1977. Localities: Brodec (Skopska Crna Gora), Ljubanci, Mavrovo, Ohrid, Oteševo, Resen, Sv. Jovan Bigorski, Vodno. Distribution: European.

Dasineura fraxinea (Kieffer, 1907)
Host: *Fraxinus excelsior* L., *F. oxycarpa* Willd. (Oleaceae). Localities: Berovo, Mavrovo, Sv. Jovan Bigorski. Distribution: European. Potential pest.

Dasineura fraxini (Bremi, 1847)
Host: *Fraxinus excelsior* L. (Oleaceae). Reference: Jurilj 1948. Distribution: European. Potential pest.

Dasineura glechomae (Kieffer, 1889)
Host: *Glechoma hederacea* L. (Lamiaceae). Locality: Mavrovo. Distribution: European.

Dasineura hyperici (Bremi, 1847)
Host: *Hypericum perforatum* L. (Hypericaceae). Localities: Mavrovo, Pobožje (Skopska Crna Gora). Distribution: European.

Dasineura irregularis (Bremi, 1847)
Host: *Acer pseudoplatanus* L. (Aceraceae). Reference: Janežić 1977 (as *Dasyneura acercrispans* Kieffer). Distribution: European. Potential pest.

Dasineura lupulinae (Kieffer, 1891)
Host: *Medicago lupulina* L. (Fabaceae). Localities: Mavrovo, Ovče pole. Distribution: European.

Dasineura mali (Kieffer, 1904)
Host: *Malus sylvestris* Mill., *M. domestica* Borkh., *M. pumila* (Rosaceae). References: Janežić 1969, 1974; Postolovski 1988, 1989. Distribution: European, secondarily Holarctic. Potential pest.

Dasineura medicaginis (Bremi, 1847)
Host: *Medicago sativa* L. (Fabaceae). Localities: Kumanovo, Petrovec, Skopje, Zelenikovo. Distribution: Euro-Siberian. Pest.

* ***Dasineura napi* (**Loew, 1850)
Syn. *Cecidomyia brassicae* (Winnertz, 1853)
Host: *Brassica oleracea* L., *B. napus* L. (Brassicaceae). Localities: Mavrovo, Mariovo, Skopje. Distribution: European. Potential pest.

Dasineura papaveris (Winnertz, 1853)
Host: *Papaver rhoeas* L., *P. somniferum* L. (Papaveraceae). Localities: Bogdanci, Sveti Nikole, Veles. Distribution: European. Potential pest.

Dasineura plicatrix (Loew, 1850)
Host: *Rubus caesius* L., *R. idaeus* L., *R. argotus* L. (Rosaceae). References: Janezić 1977; Postolovski 1988, 1989. Localities: Brodec, Gorno Sonje. Distribution: European. Potential pest.

****Dasineura populeti*** (Rübsaamen, 1889)
Host: *Populus tremula* L. (Salicaceae). Locality: Mavrovo. Distribution: Euro-Siberian.

Dasineura praticola (Kieffer, 1892)
Host: *Viscaria atropunctata* Gris. (Caryophyllaceae). Reference: Baudyš 1928. Distribution: European.

****Dasineura pteridicola*** (Kieffer, 1901)
Host: *Pteridium aquilinum* (L.) Kuhn. (Dennstaedtiaceae). Localities: Mavrovo, Vratnica (Šara). Distribution: European.

****Dasineura pteridis*** (Müller, 1871)
Syn. *Cecidomyia filicina* Kieffer, 1889
Host: *Pteridium aquilinum* (L.) Kuhn. (Dennstaedtiaceae). Localities: Mavrovo, Osogovo, Pelister, Vratnica (Šara mountain). Distribution: Euro-Siberian.

Dasineura pyri (Bouché, 1847)
Host: *Pyrus communis* L., *P. pyraster* Borkh. (Rosaceae). References: Janežić 1977; Postolovski 1988, 1989; Postolovski & Lazarevska 1997. Localities: Resen, Struga. Distribution: European, secondarily Holarctic. Pest.

Dasineura ranunculi (Bremi, 1847)
Host: *Ranunculus repens* L., *R. acer* L. (Ranunculaceae). Reference: Simova-Tošić 1968. Distribution: Euro-Siberian.

Dasineura rosae (Bremi, 1847)
Syn. *Wachtliella rosarum* (Hardy, 1850)
Host: *Rosa canina* L. and other species of the genus *Rosa* (Rosaceae). References: Janežić 1977; Postolovski 1988. Localities: Gorno Količane (Kitka), Katlanovska Banja, Kažani (near Bitola), Krušje (Babuna), Mavrovo. Distribution: Euro-Siberian.

****Dasineura ruebsaameni*** (Kieffer, 1909)
Host: *Carpinus betulus* L. (Corylaceae). Locality: Resen. Distribution: European.

Dasineura rufescens (Stefani, 1898)
Host: *Phillyrea media* (L.) (Oleaceae) Reference: Janežić 1977. Distribution: Mediterranean.

****Dasineura sisymbrii*** (Schrank, 1803)
Host: *Rorippa silvestris* (L.) Bess. (Brassicaceae). Localities: Lisiče, Saraj (near Skopje). Distribution: European.

Dasineura symphyti (Rübsaamen, 1891)
Host: *Symphytum officinale* L. (Boraginaceae). Locality: Veles. Distribution: European.

Dasineura tetensi (Rübsaamen, 1891)
Host: *Ribes nigrum* L. (Grossulariaceae). References: Simova & Dobrivojević 1981; Postolovski 1988, 1989. Distribution: European. Pest.

Dasineura thomasiana (Kieffer, 1888)
Host: *Tilia tomentosa* Moench. (Tiliaceae). Reference: Janežić 1977. Distribution: European.

****Dasineura tiliae*** (Schrank, 1803)
Syn. *Cecidomyia tiliamvolvens* Rübsaamen, 1889
Host: *T. platyphyllos* Scop. (Tiliaceae). Locality: Skopski park. Distribution: Euro-Siberian.

Dasineura tortilis (Bremi, 1847)
Host: *Alnus glutinosa* (L.) Gaertn. (Betulaceae). References: Janežić 1977. Distribution: European.

Dasineura tortrix (F. Löw, 1877)
Host: *Prunus spinosa* L., *P. domestica* L., *Armeniaca vulgaris* L. (Rosaceae). References: Postolovski 1988, 1989. Localities: Berovo, Gorno Sonje, Mavrovo. Distribution: European. Pest.

Dasineura trifolii (F. Löw, 1874)
Host: *Trifolium repens* L. (Fabaceae). Reference: Janežić 1977. Localities: Berovo, Mavrovo, Skopje. Distribution: Euro-Siberian, secondarily Holarctic.

Dasineura tympani (Kieffer, 1909)
Host: *Acer campestre* L. (Aceraceae). Localities: Brodec, Gorno Sonje, Ljubance (Skopska Crna Gora). Distribution: European.

Dasineura urticae (Perris, 1840)
Host: *Urtica dioica* L. (Urticaceae). Localities: Bogdanci, Mavrovo, Ohrid, Skopje. Distribution: Euro-Siberian.

Dasineura verbasci (Kieffer, 1888)
Host: *Verbascum lychnitis* L. (Scrophulariaceae). Locality: Galičica. Distribution: European.

Dasineura viciae (Kieffer, 1888)
Host: *Vicia cracca* L., *V. sativa* L. (Fabaceae). Localities: Lisiče (near Skopje), Mavrovo, Saraj, Tetovo. Distribution: Euro-Siberian.

Didymomyia tiliacea (Bremi, 1847)
Syn. *Hormomyia reaumuriana* F. Löw, 1878
Host: *Tilia cordata* Mill., *T. platyphyllos* Scop. (Tiliaceae). Reference: Janežić 1977. Localities: Ohrid, Prilep, Saraj (near Skopje), Skopski Park. Distribution: Euro-Siberian.

Drisina glutinosa Giard, 1893
Host: *Acer monspessulanum* L. *A. pseudoplatanus* L. (Aceraceae). References: Janežić 1977. Locality: Sveti Jovan Bigorski. Distribution: European. Potential pest.

Dryomyia circinans (Giraud, 1861)
Host: *Quercus cerris* L., Q. *macedonicum* L.(Fagaceae). References: Jurilj 1948; Janežić 1977, Simova-Tosić 1971. Localities: Brodec (Skopska Crna Gora), Galičica, Vratanica (Šara). Distribution: Mediterranean.

Geocrypta galii (Loew, 1850)
Host: *Galium aparine* L., *G. verum* L. (Rubiaceae). References: Jurilj 1948; Janežić 1977. Localities: Ramno (Skopska Crna Gora), Saraj (near Skopje). Distribution: Euro-Siberian.

Harmandiola cavernosa (Rübsaamen, 1899)
Host: *Populus tremula* L. (Salicaceae). References: Jurilj 1948. Locality: Sveti Jovan Bigorski. Distribution: Euro-Siberian.

Harmandiola globuli (Rübsaamen, 1889)
Host: *Populus tremula* L. (Salicaceae). Locality: Mavrovo. Distribution: Euro-Siberian.

Harmandiola pustulans Kieffer, 1909
Host: *Populus tremula* L. (Salicaceae). Locality: Saraj (near Skopje). Distribution: European.

Harmandiola tremulae (Winnertz, 1853)
Host: *Populus tremula* L. (Salicaceae). Reference: Jurilj 1948 (as *Harmandia loewi* Rübs.). Distribution: Euro-Siberian.

Hartigiola annulipes (Hartig, 1839)
Host: *Fagus sylvatica* L. (Fagaceae). Localities: Kitka, Vratnica (Šara). Distribution: European.

Iteomyia capreae (Winnertz, 1853)
Host: *Salix caprea* L. (Salicaceae). References: Vratnica (Šara). Distribution: Euro-Siberian.

Jaapiella floriperda (F. Löw, 1888)
Host: *Silene vulgaris* (Moench) Garcke (Caryophyllaceae). Locality: near the river Lepenc at Skopje. Distribution: European.

Jaapiella genisticola (F. Löw, 1877)
Host: *Genista depressa* M.B. (Fabaceae). Reference: Baudyš 1928. Distribution: European.

Jaapiella jaapiana (Rübsaamen, 1914)
Host: *Medicago lupulina* L. (Fabaceae). Locality: Saraj (near Skoplje). Distribution: European.

Jaapiella medicaginis (Rübsaamen, 1912)
Host: *Medicago sativa* L. (Fabaceae). Localities: Lisiče, Novo Selo (near Veles), Pretor (Prespa lake). Distribution: Euro-Siberian. Potential pest.

Jaapiella veronicae (Vallot, 1827)
Host: *Veronica chamaedrys* L., *V. officinalis* L. (Scrophulariaceae). Localities: Brodec (Skopska Crna Gora), Mavrovo, Berovo (near the river Bregalnica). Distribution: European.

****Jaapiella volvens*** Rübsaamen, 1917
Host: *Lathyrus pratensis* L. (Fabaceae). Locality: Biljanini izvori (Ohrid). Distribution: Euro-Siberian.

Janetia cerris (Kollar, 1850)
Host: *Quercus cerris* L., *Q. macedonica* DC. (Fagaceae). References: Baudyš 1928; Jurilj 1948; Janežić 1977. Localiteies: Brodec (Skopska Crna Gora), Katlanovska Banja, Mavrovo, Sveti Jovan Bigorski, Vratnica (Šara). Distribution: Mediterranean.

Janetia homocera (F. Löw, 1877)
Host: *Quercus cerris* L. (Fagaceae). Reference: Janežić 1977. Localities: Kitka, Vratnica (Šara). Distribution: Mediterranean.

****Janetia nervicola*** (Kieffer, 1909)
Host: *Quercus cerris* L. (Fagaceae). Localities: Brodec (Skopska Crna Gora), Mavrovo, Sveti Jovan Bigosrski, Vratnica (Šara). Distribution: Mediterranean.

****Janetia pustularis*** (Kieffer, 1909)
Host: *Quercus cerris* L. (Fagaceae). Localities: Kitka, Mavrovo, Sveti Jovan Bigorski. Distribution: Mediterranean.

Janetiella lemeei (Kieffer, 1904)
Host: *Ulmus carpinifolia* Gled. (Ulmaceae). Reference: Janežić 1977. Locality: Vodno (near Skopje). Distribution: European.

Janetiella oenephila (Haimhoffen, 1875)
Host: *Vitis vinifera* L. (Vitaceae). Reference: Postolovski 1988. Locality: Veles. Distribution: Mediterranean.

****Janetiella thymi*** (Kieffer, 1888)
Host: *Thymus serpyllum* L. (Lamiaceae). Localities: Brodec (Skopska Crna Gora), Vodno (near Skopje). Distribution: Euro-Siberian.

Kiefferia pericarpiicola (Bremi, 1847)
Host: *Daucus carota* L., *Foeniculum vulgare* Mill., *Pastinaca sativa* L., *Pimpinella major* (L.) Huds. (Apiaceae). Reference: Janežić 1977. Localities: Bogdanci, Ohrid, Skopje, Strumica. Distribution: Euro-Siberian. Potential pest.

Lasioptera carophila F. Löw, 1874
Host: *Daucus carota* L., *Foeniculum vulgare* Mill., *Pastinaca sativa* L., *Pimpinella major* (L.) Huds. (Apiaceae). Reference: Janežić 1977. Localities: Berovo, Bogdanci, Skopje, Strumica. Distribution: European.

****Lasioptera eryngii*** (Vallot, 1829)
Host: *Eryngium campestre* L. (Apiaceae). Localities: Brodec (Skopska Crna Gora), Gorno Sonje. Distribution: sub-Mediterranean.

****Lasioptera populnea*** Wachtl, 1883
Host: *Populus alba* L. (Salicaceae). Locality: Mavrovo. Distribution: European.

Lasioptera rubi (Schrank, 1803)
Host: *Rubus caesius* L., *R. fruticosus* L. (Rosaceae). References: Postolovski 1988, 1989. Localities: Brodec (Skopska Crna Gora), Gorno Sonje. Distribution: Euro-Siberian. Pest.

Macrodiplosis pustularis (Bremi, 1847)
Syn. *Diplosis dryobia* (F. Löw, 1877)
Host: *Quercus cerris* L., *Q. farnetto* Ten., *Q. pubescens* Willd. (Fagaceae). References: Jurilj 1948, Janežić 1977. Locality: Sveti Jovan Bogorski. Distribution: European.

Macrodiplosis roboris (Hardy, 1854)
Syn. *Macrodiplosis volvens* Kieffer, 1895
Host: *Quercus cerris* L., *Q. frainetto* Ten., *Q. pubescens* Wild. (Fagaceae). References: Jurilj 1948; Janežić 1977. Localities: Mavrovo, Sveti Jovan Bigorski, Vrtanica (Šara). Distribution: European.

****Mayetiola graminis*** (Fourcroy, 1785)
Syn. *Cecidomyia poae* (Bosc, 1817)
Host: *Poa nemoralis* L. (Poaceae). Localities: Mavrovo, Skopje. Distribution: European.

Mikiola fagi (Hartig, 1839)
Host: *Fagus sylvatica* L., *F. moesiaca* (Domin, Maly) Czeczott (Fagaceae). References: Jurilj 1948; Janežić 1977. Localities: Gorno Količane (Kitka), Krušje (Babuna), Mavrovo, Vratnica (Šara). Distribution: European. Potential pest.

Mikomya coryli (Kieffer, 1901)
Host: *Corylus avellana* L. (Corylaceae). Reference: Janežić 1977. Locality: Vratnica (Šara). Distribution: European.

Monarthropalpus flavus (Schrank, 1776)
Syn. *Cecidomyia buxi* Laboulbéne, 1873
Host: *Buxus sempervirens* L. (Buxaceae). Reference: Karaman 1960; Simova Tošić et al. 1985. Distribution: European, secondarily Holarctic. Pest.

Oligotrophus juniperinus (Linnaeus, 1758)
Host: *Juniperus communis* L. (Cupressaceae). Reference: Baudyš 1928 (as *Oligotrophus* sp.). Locality: Mavrovo. Distribution: European.

Oligotrophus panteli Kieffer, 1898
Host: *Juniperus communis* L. (Cupressaceae). References: Baudyš 1928; Jurilj 1948. Distribution: European.

Oligotrophus schmidti Rübsaamen, 1914
Host: *Juniperus communis* L. (Cupressaceae). References: Jurilj 1948. Distribution: European.

****Ozirhincus millefolii*** (Wachtl, 1884)
Host: *Achillea milllefolium* L. (Asteraceae). Locality: Brodec (Skopska Crna Gora). Distribution: Euro-Siberian.

Paradiplosis abietispectinatae (Tubeuf, 1930)
Syn. *Agevillea abietis* Hubault, 1945
Host: *Abies alba* Links (Pinaceae). Reference: Jurilj 1948 (as Cecidomyidarum gen. et spec.). Distribution: European.

Phyllodiplosis cocciferae (Tavares, 1902)
Host: *Quercus coccifera* L. (Fagaceae). Reference: Janežić 1977 (as *Contarinia cocciferae* Tav.). Distribution: Mediterranean.

****Physemocecis hartigi*** (Liebel, 1892)
Host: *Tilia platyphyllos* Scop. (Tiliaceae). Locality: Saraj (near Skopje). Distribution: European.

Physemocecis ulmi (Kieffer, 1909)
Host: *Ulmus carpinifolia* Gled. (Ulmaceae). Reference: Janežić 1977. Distribution: European.

Placochela nigripes (F. Löw, 1877)
Host: *Sambucus nigra* L. (Caprifoliaceae). Reference: Janežić 1977. Distribution: European.

Porricondyla pubescens (Walker, 1856)
Biology unknown. Adults were caught. Reference: Szadziewski 1975. Distribution: Euro-Siberian.

Probruggmanniella phillyreae (Tavares, 1907)
Host: *Phillyrea media* L. (Oleaceae). Reference: Janežić 1977 (as *Schizomyia phillyreae* Tavares). Distribution: Mediterranean.

Putoniella pruni (Kaltenbach, 1872)
Host: *Prunus domestica* L., *P. spinosa* L. (Rosaceae). Reference: Postolovski 1988 (as *Putoniella marsupialis* F. Löw). Localities: Berovo, Konjari, Novo Selo, Štipsko, Tetovo. Distribution: European. Pest.

Rabdophaga clavifex (Kieffer, 1891)
Host: *Salix alba* L., *S. incana* L. (Salicaceae). Reference: Jurilj 1948. Distribution: Euro-Siberian.

****Rabdophaga marginemtorquens*** (Bremi, 1847)
Host: *Salix alba* L. (Salicaceae). Locality: Udovo (near the river Vardar). Distribution: Euro-Siberian.

Rabdophaga pierrei (Kieffer, 1896)
Host: *Salix alba* L., *S. purpurea* L. (Salicaceae). Reference: Jurilj 1948. Distribution: European.

****Rabdophaga rosaria*** (Loew, 1850)
Host: *Salix alba* L. (Salicaceae). Localities: Mavrovo, Saraj (near Skopje), Sveti Jovan Bigorski. Distribution: Euro-Siberian.

Rabdophaga salicis (Schrank, 1803)
Host: *Salix cinerea* L., *S. purpurea* L. (Salicaceae). Reference: Jurilj 1948. Localities: Krušje (Babuna), Struga, Sv. Jovan Bigorski. Distribution: Euro-Siberian.

Rabdophaga terminalis (*Loew*, 1850)
Host: *Salix alba L.*, *S. purpurea* L. (Salicaceae). Reference: Janezic 1977. Localities: Biljanini Izvori (Ohrid), Krušje (Babuna), Mavrovo, Saraj (near Skopje), Vratnica (Šara). Distribution: Euro-Siberian.

****Rhopalomyia baccarum*** (Wachtl, 1883)
Host: *Artemisia vulgaris* L. (Asteraceae). Localities: Kičevo, Mavrovo. Distribution: Euro-Siberian.

****Rhopalomyia foliorum*** (Loew, 1850)
Host: *Artemisia vulgaris* L. (Asteraceae). Reference: Janežić 1977 (as *Diarthronomyia foliorum* H. Lw.). Localities: Dojran, Gevgelija. Distribution: Euro-Siberian.

****Rondaniola bursaria*** (Bremi, 1847)
Host: *Glechoma hederacea* L. (Lamiaceae). Locality: Skopski park. Distribution: European.

****Sackenomyia reaumurii*** (Bremi, 1847)
Syn. *Phlyctidobia solmsi* Kieffer, 1906
Host: *Viburnum lantana* L. (Caprifoliaceae). Locality: Berovo. Distribution: European.

****Schizomyia galiorum*** Kieffer, 1889
Host: *Galium aparine* L. (Rubiaceae). Locality: Gorno Sonje. Distribution: Euro-Siberian.

Semudobia betulae (Winnertz, 1853)
Host: *Betula pendula* Roth. (Betulaceae). References: Janežić 1977, Simova et al. 1982. Distribution: Euro-Siberian – Holarctic.

Semudobia skuhravae Roskam, 1977
Host: *Betula pendula* Roth. (Betulaceae). References: Janezić 1977 (as uknown species); Simova et al.1982. Distribution: Euro-Siberian.

Semudobia tarda Roskam, 1977
Host: *Betula pendula* Roth. (Betulaceae). Reference: Simova et al. 1982. Distribution: Euro-Siberian.

Sitodiplosis mosellana (Géhin, 1856)
Host: *Triticum vulgare* L. (Poaceae). Locality: Ovče Pole. Distribution: European, secondarily Holarctic. Potential pest.

Spurgia euphorbiae (Vallot, 1827)
Syn. *Cecidomyia capitigena* Bremi, 1847 (*Bayeriola capitigena* Bremi, 1847)
Cecidomyia subpatula Bremi, 1847
Host: *Euphorbia cyparissias* L. (Euphorbiaceae). Reference: Jurilj 1948, Janežić 1977. Localities: Brodec (Skopska Crna Gora), Katlanovska banja, Mavrovo, Resen, Saraj (near Skopje), Sveti Naum (Ohrid lake). Distribution: European.

Stefaniella brevipalpis Kieffer, 1898
Host: *Atriplex portulacoides* L. (Chenopodiaceae). Reference: Trotter 1903. Distribution: sub-Mediterranean.

Stomatosema obscura (Mamaev, 1967)
Biology not known. Adults were caught. Reference: Szadziewski 1975. Distribution: Holarctic.

Trisopsis abdominalis Mamaev, 1961
Biology not known. Adults were caught. Reference: Szadziewski 1975. Distribution: Europo-Siberian.

Wachtliella niebleri Rübsaamen, 1915
Host: *Cytisus microphyllus* Boiss. ((Fabaceae). Reference: Baudyš 1928 (as Cecidomyidae, sp.). Distribution: European.

****Wachtliella persicariae*** (Linné, 1767)
Host: *Polygonum amphibium* L. (Polygonaceae). Localities: Biljanini izvori (Ohrid), Mavrovo, Orman (near Skopje). Distribution: European.

****Zeuxidiplosis giardi*** (Kieffer, 1896)
Host: *Hypericum perforatum* L. (Hypericaceae). Locality: Brodec (Skopska Crna Gora). Distribution: European, secondarily Holarctic.

****Zygiobia carpini*** (F. Löw, 1874)
Host: *Carpinus betulus* L. (Corylaceae). Localities: Gorno Kolicane (Kitka), Kadina reka (Kitka), Krusje (Babuna), Sveti Jovan Bigorski. Distribution: European.

EVALUATION OF RESULTS

Number of species forming the present fauna

The present gall midge fauna of Republic Macedonia includes 148 species, of which 68 are new records. In general, the level of knowledge of gall midge fauna of Macedonia may be evaluated as not too high in comparison with gall midge faunas of adjacent countries. It is richer than the gall midge fauna of Montenegro where 85 species are known (Simova-Tošić et al. 2001) and of Albania where only 11 gall midge species are known to occur (Skuhravá et al.1984). It is comparable with gall midge faunas of Greece with 167 species (Skuhravá & Skuhravý 1997) and of Bosnia and Hercegovina with 169 species (Simova-Tošić et al. 2005). It is poorer than fauna of Serbia including 283 species (Simova-Tošić et al. 2000). In comparison, 240 gall midge species are known to occur in Bulgaria (Skuhravá et al.1991, 1992), 310 species in Romania (Skuhravá et al. 1972), 332 species in Hungary (Skuhravá & Skuhravý 1999) and more than 400 species in Italy where intensive investigations were carried out in northern part in last four years and the species number, 234 species, given in the paper of Skuhravá & Skuhravý (1994) increased by 160 species (Skuhravá, Skuhravý & Hellrigl 2001; 2002; Skuhravá & Skuhravý 2003).

Zoogeography

Gall midges occurring in Macedonia may be divided, according to their overall distribution, into several groups: European, Euro-Siberian, Mediterranean and sub-Mediterranean and Holarctic or cosmopolitan (Skuhravá 1987, 1997b).

Of all 148 gall midge species forming the fauna of Macedonia, 83 species (57%) belong to European. They have their centres of origin in Europe. Their areas may range from very small to large. Typical representatives of European species with large distribution areas are *Mikiola fagi* and *Hartigiola annulipes* associated with *Fagus sylvatica*, *Macrodiplosis pustularis* and *M. roboris* with *Quercus robur* and other *Quercus* spp. and *Zygiobia carpini* with *Carpinus betulus*.

Forty three species (30%) may be regarded as Euro-Siberian. They occur in Europe, extending at least to Western Siberia, and a few species reach up to the most eastern part of the Palaearctic Region. Typical representatives of Euro-Siberian species occurring in Macedonia are *Harmandiola cavernosa* and *H. tremulae* associated with *Populus tremula*, *Lasioptera rubi* with *Rubus* spp. and *Iteomyia capreae* and species of the genus *Rabdophaga* associated with various species of the genus *Salix*.

Eighteen species (12%) may be considered to be Mediterranean or sub-Mediterranean. The true Mediterranean species are associated with Mediterranean host plant species and occur in areas along the coast or near the coast of the Adriatic Sea. The sub-Mediterranean species have larger distribution areas and may reach up to Central Europe where they usually reach the northern boundary of their distribution area, as for example *Lasioptera eryngii* with *Eryngium campestre*, *Asphondylia verbasci* with various species of *Verbascum*. The following species are typical representatives of the Mediterranean and sub-Mediterranean fauna occurring in Macedonia: *Contarinia subulifex*, *C. quercicola*, *Dryomyia circinans*, *Janetia cerris*, *J. homocera*, *J. nervicola*, *J. pustularis* on *Quercus cerris*, *Phyllodiplosis cocciferae* on *Quercus coccifera*, *Baldratia salicorniae* on *Salicornia fruticosa*, *Dasineura rufescens* and *Probrugmanniella phillyreae* on *Phillyrea media*, *Stefaniella brevipalpis* on *Atriplex portulacoides*, *Janetiella oenephila* on *Vitis vinifera*, *Apiomyia bergenstammi* on *Pyrus communis*, *Asphondylia ononidis* on *Ononis spinosa* and *Craneiobia corni* on *Cornus sanguinea*.

Twelve species have Holarctic distributions, occurring in Europe and in North America. Most of them are species of European origin which have been transported to North America with agricultural or forest materials. *Contarinia tritici* and *Sitodiplosis mosellana* associated with cereals, *Dasineura mali* and *Dasineura pyri* associated with fruit trees and *Monarthropalpus flavus* developing on ornamental shrub *Buxus sempervirens* are primarily European species which were transported to North America and have now the Holarctic type of distribution. Some of them were imported to other zoogeographical regions and now have even cosmopolitan distributions. *Aphidoletes aphidimyza*, larvae of which are predators of aphids, is such a species with a cosmopolitan distribution.

Economic importance

Of 147 gall midge species recorded in Macedonia, eleven occurred as pests in the past, some of them are pests at present and about seventeen species may be considered as potential pests for the future. The following species may be considered as pests: *Apiomyia bergenstammi*, *Asphondylia miki*, *A. pruniperda*, *Contarinia medicaginis*, *C. pyrivora*, *Dasineura medicaginis*, *D. pyri*, *D. tortrix*, *Lasioptera rubi*, *Monartropalpus flavus* and *Putoniella pruni* and the following species as potential pests: *Acericecis vitrina* (= *Harrisomia vitrina*), *Asphondylia melanopus*, *Contarinia nasturtii*, *C. pisi*, *Dasineura fraxinea*, *D. mali*, *D. napi* (= *D. brassicae*), *D. papaveris*, *D. plicatrix*, *Drisina glutinosa*, *Jaapiella medicaginis*, *Kiefferia pericarpiicola*, *Mikiola fagi*, *Sitodiplosis mosellana*.

Karaman (1960) observed a mass occurence of *Monarthropalpus flavus* which caused serious damages starting with early defoliation of *Buxus* shrubs in Skopje and its surrounding during 1957–1958. Mostly 100 % leaves were attacked, with the average number 17 larvae per leaf. He studies the biology, damage, enemies and control measures.

Simova-Tošić & Ančev (1979) found galls of *Apiomyia bergenstammi* on *Pyrus communis* for the first time in pear orchards in vincinity of Skopje in 1977. The intensity of attack was about 2 % but some branches of domestic variety (Trevuška) were covered with galls. About 90 % of overewintering larvae were attacked by parasitoids as well by a microorganismus that diminished population density in the next year.

Simova-Tošić & Dobrivojević (1981) registered mass occurrence and severe damage on black current shoots caused by the larvae of *Dasineura tetensi* in Berovo in 1977. About 80–90 % plants were attacked.

Dobrivojević et al. (1981) reported that *Asphondylia pruniperda* causing galls on flower buds of *Prunus domestica* appeared in Berovo during 1977–1980 and caused serious damage on plum trees (Stenley variety). The intensity of attack was very high. On twigs there were found from 2 to 20 galls, on the average of 6,67 damaged buds. That was the reason for exacavation of many young plum trees in orchards. Also ornamental plum trees in Skopje were severely attacked and their flowering in next year was diminished.

Postolovski (1988) studied ten gall midge species that caused serious damage to economically important host plant trees in Macedonia during the period from 1981 to1984, viz. *Apiomyia bergenstammi*, *Asphondylia pruniperda*, *Contarinia pyrivora*, *Dasineura mali*, *D. pyri*, *D. plicatrix*, *D. tetensi*, *D. tortrix*, *Putoniella pruni* and *Lasioptera rubi*. Of them, *Apiomyia bergenstammi* showed the greatest economic importance and therefore it was studied in detail. Investigations were carried out under natural condition in Bistrica (region of Bitola) and Zelenikovo (near Skopje) as well as in laboratory.

Postolovski (1989) studied in detail the morphology and biology of *Apiomyia bergenstammi*, its harmfulness, succeptibility of different pear varieties to attack, parasitoids, predators and economic importance. The percentage of died trees amounted 1–5 % on orchards of size 40 ha and in a smaller orchards of the size about 2 ha even as much as 40 %. The two of the most susceptible varieties proved to be native at Kantarka and Trevuška. The life history and harm of

A. pruniperda were studied at Berovo. The attack ranged from 5–10 %, even to 30 % at certain orchards, depending on the plum variety.

Dasineura tortix was common in plum and apricot nurseries in Berovo and in Skopje. The intensity of attack ranged from 40–60 % causing considerable quality losses due to the terminal shooting. *Dasineura pyri* was established in many localities causing early defoliation especialy in the orchards with foliar fertilisation and irrigation and therefore it appeared in the list for the integrated control management (Postolovski & Lazarevska 1997).

Six gall midge species associated with fruit trees, viz. *Contarinia pyrivora*, *Dasineura mali*, *D. tetensi*, *D. plicatrix*, *Lasioptera rubi* and *Putoniella pruni*, although occur on their host threes at many localities in Macedonia, did not cause any significant damage during the period of investigations.

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Is *Lepidoglyphus pilosus* a true species or a form of *L. s destructor* (Acari: Glycyphagidae)? Morphometrical analysis

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Abstract. Within the common species *Lepidoglyphus destructor* (Schrank, 1781) two different forms were found: a large one with posterior dorsal idiosomal setae (d_4, sai) not exceeding the body length by more than approximately 1.5× and a smaller one with setae twice the length of the body. The former is identified as *L. destructor* and latter as *L. pilosus* (Oudemans, 1906). Our data on the size of the idiosoma and sai, in contrast to other characters, shows two distinct groups. The smaller individuals are *L. pilosus* and the larger *L. destructor*. The mean length of the idiosoma in both sexes is about 100 µm shorter in *L. pilosus* than *L. destructor*. There are slight differences in the thickness and setosity of sai : sai of *L. pilosus* are thicker and more bushy, with bigger hooklets at the end of branches than in *L. destructor*. Regardless of these differences, it is debatable whether *L. pilosus* is a true species or a form of *L. destructor*. A genetical or molecular analysis is needed to resolve this problem. *L. pilosus* was found only once and the specimen was a male, our material is the second finding and is new for the Czech Republic.

Taxonomy, morphology, stored grain mites, morphometrics, Acari, Glycyphagidae, *Lepidoglyphus* , Czech Republic, Palaearctic region

INTRODUCTION

Oudemans (1904) wrote: “I found one ♂ *Glycyphagus* which immediately arrested my attention by its long abdominal hairs, which were more than twice longer its own body. At once I was convinced of having found back again the lost *Acarus setosus* of C. L. Koch (1841).” Oudemans re-described this male as *Glycyphagus setosus*. (C .L. Koch, 1841), (found in surroundings of Bremen). Two years later Oudemans obtained another material of mites (nymphs, males and females) and was sure, that this new material was the lost *Acarus setosus* (C. L. Koch). The mites differed from the firstly found male and therefore he re-named this male as *Glycyphagus pilosus*. The mites found for the second time did not have crista metopica and subtarsal scale and Oudemans wrote that “this species belongs neither to the *destructor* – nor to the *cadaverum* group” (by the present nomenclature it means that it belongs neither to *Lepidoglyphus* nor to *Glycyphagus*). By our opinion they could well correspond to the type material for *Cometacarus setosus* (C. L. Koch, 1841). However, it is only an assumption, which can hardly be proven, because the type material of A. *setosus* is apparently lost and the original description too incomplete. Since then there has been no reference to *Glycyphagus pilosus*, only Zakhvatkin (1941) synonymised *G. pilosus* with *G. setosus*. Zachvatkin (1936) divided the genus *Glycyphagus* into two genera, *Lepidoglyphus* and *Glycyphagus*, based on the presence or absence of the subtarsal scale. According to this character *G. pilosus* should be *Lepidoglyphus pilosus* (Oudemans)

A hundred years later, when identifying mites from a grain store in Buštěhrad near Prague, (1999–2003) I (E. Ž.) experienced a similar feeling to Oudemans. Mites of the genus *Lepidoglyphus* occurred in two different forms: a large one with posterior dorsal idiosomal setae (d_4, sai)

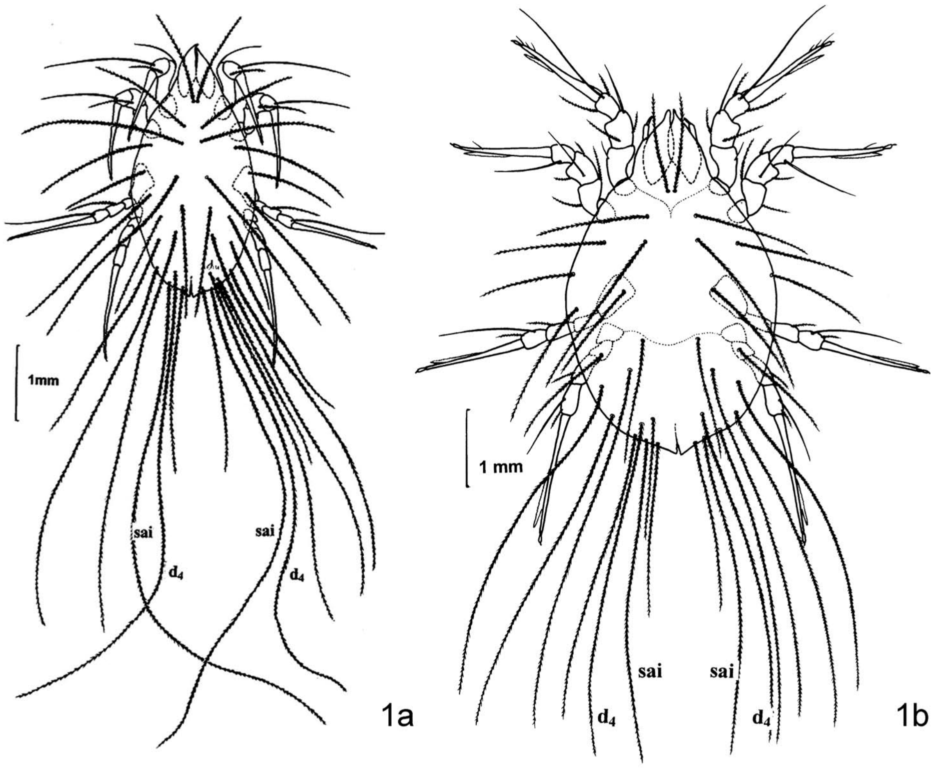

Fig. 1. Habitus of males of *Lepidoglyphus*. *pilosus* (Oudemans (A) and *L desctructor* (Schrank) (B). Scale line = 0. 1 mm (supracoxal setae are not drawn in; subtarsal setae are not visible on *L. pilosus*, because they are on the lower part of the tarsus).

not exceeding the length of the body by more than approximately 1.5x and a small one in which the setae are twice as long as the body. When I re-examined my old slides of *L. destructor*, I found a note "long hairs" on some of them. This means that I must have found *L. pilosus* many years ago but identified it as *L. destructor* (Fig. 1). *L. pilosus* was not very common; I encountered it only nine times during almost forty years of research. All localities are in Bohemia (Varnsdorf, dry marjoram leaves, 1967; Satalice, fodder for game, 1973; Pečky, grain store, wheat, 1976; Kralupy, mill, sweepings, 1982; Dynín, silo bins, wheat,1987; Česká Skalice silo bins, wheat, 1988) and Moravia (Mohelno, distillery, barley, 1985; Smrk, hangar, wheat, 1986; Moravské Okříšky, mixture of grain, 1987).

As the validity of these two species is still debatable, the material in my collection was studied in order to clarify some of the points.

MATERIALS AND METHODS

We investigated in detail characters of 60 males (30 of *Lepidoglyphus pilosus*, 30 of *L. destructor*) and 55 females (25 of *L. pilosus*, 30 of *L. destructor*) from our collections which apparently contained both species (Table 1). The individuals examined were very much alike in many aspects (Figs. 1A, B). We examined the length of setae on genu I $\delta_{1,2}$ and Φ on tarsus I, anal setae, dorsal setae, (Hughes 1976) supracoxal seta (Oudemans (1904) presented picture of this seta) and the shape of the penis. A scanning electron microscope (SEM) was used in order to search for different characters on setae sai, which differ most in length.

We subjected these measurements [i.e., length of idiosoma (idiosoma was measured from setae vi to the end of the body), ratio sai : idiosoma] to K-mean clustering analysis (within S-Plus®), which separated the individuals into two groups (Fig. 2). Subsequently the separation was tested using Hotelling's T^2 test statistics in the Discriminant analysis.

All studied specimens can be found in the collection of mites in the Research Institute of Crop Production, Prague.

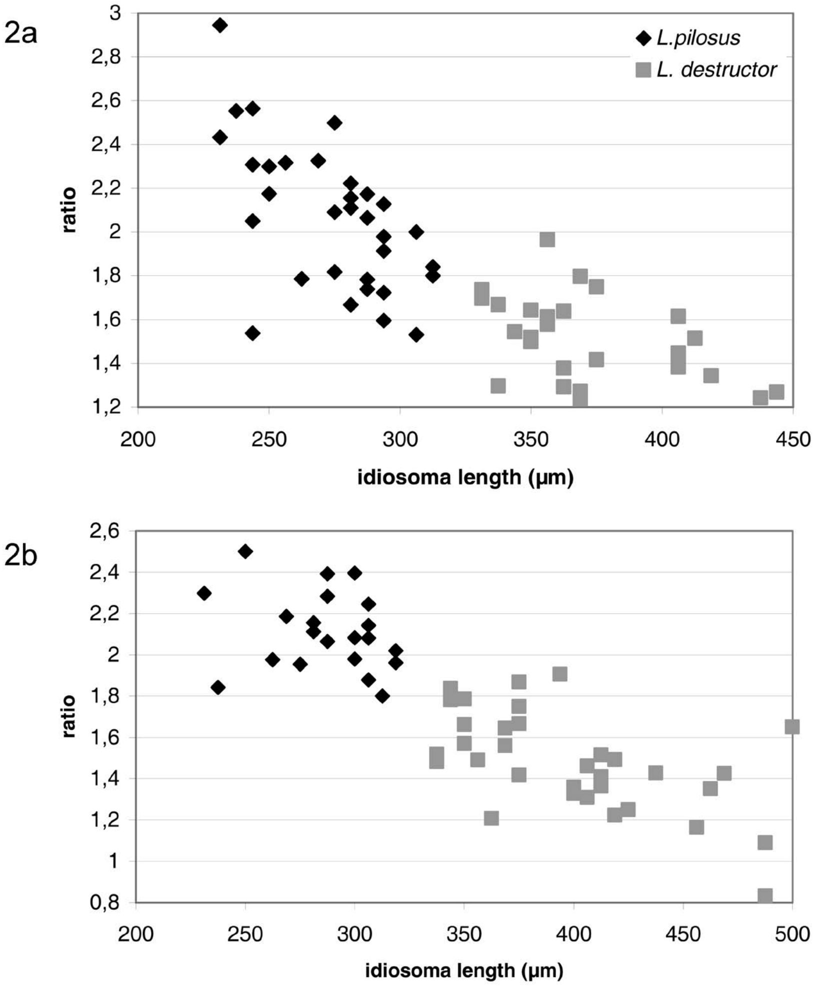

Fig. 2. Relationship between the length of idiosoma and the ratio (sai : idiosoma) for males (A) and females (B) of *Lepidoglyphus pilosus* (Oudemans) and *L. destructor* (Schrank).

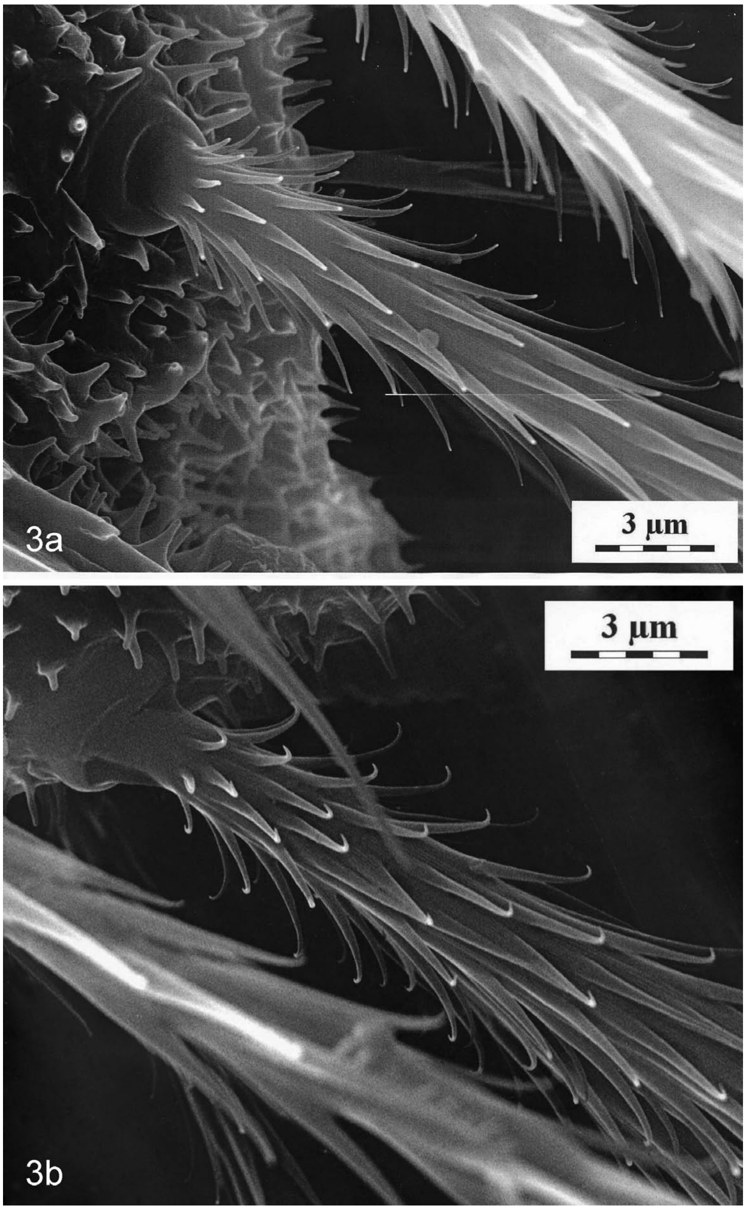

Fig. 3. SEM pictures of setae sai of *Lepidoglyphus destructor* (Schrank) (A) and *L. pilosus* (Oudemans) (B).

RESULTS AND DISCUSSION

The separation of the two groups was highly significant (P<0.000001) for both males and females. However the ratio (sai : idiosoma) varied greatly (0.8–3) in both sexes without any distinct separation (Fig. 2), although, in *Lepidoglyphus destructor* the setae were on average 1.5-times, and in *L. pilosus* about 2-times longer than the idiosoma (Table 1). Data on the length of the idiosoma, in contrast to the former character, indicates two distinct groups, those with an idiosoma that is longer or shorter than 320 µm. The smaller individuals were *L. pilosus* and the larger *L. destructor*. The mean length of the idiosoma in both sexes was about 100 µm shorter in *L. pilosus* than *L. destructor*. Thus it appears that the size of the idiosoma is a better morphological character than the ratio for separating the two species.

There was little difference in the length of male anal setae. Whereas pa_2 is about the same length (30 µ) in both species, pa_1 and pa_3 are much longer in *L. pilosus* (130 and 150µm in *L* . *destructor* and 164 and 240 µm in *L. pilosus*.) However, the ratios pa_1:pa_2, pa_1:pa_3 and pa_2:pa_3 are the same in both species being 5.3, 1.4 and 7.5, respectively. Over all the only differences were in the length of the idiosoma and setae d_3, d_4, l_3 and sai.

There were slight differences in the thickness and setosity of sai (Fig. 3): sai of *L. pilosus* were thicker and more bushy, with bigger hooklets at the end of branches than those of *L. destructor*.

The female of *L. pilosus* has not been known until now. Since it is not yet clear if *L. pilosus* is a valid species and since the supposed *pilosus* females from our collections do not differed from females of *L. destructor* except for the length of idiosoma and dorsal setae (d_3, d_4, l_3 and sai), we only present measurements of idiosoma and sai , which were measured in this study of both species for comparison (Table 2).

Table 1. The length of the idiosoma (µm) and the ratio (sai : idiosoma) of *Lepidoglyphus destructor* (Schrank) and *L. pilosus* (Oudemans)

species	sex	idisosoma mean ± SD	range	ratio mean ± SD	range
L. pilosus	males	274±24.2	231–313	2.07±0.33	1.53–2.95
	females	284±29.5	206–319	2.13±0.31	1.57–3.18
L. destructor	males	375±32.2	331–444	1.51±0.19	1.24–1.96
	females	407±51.1	338–500	1.47±0.24	0.83–1.90

It is still unclear whether these two species are true species or only strains of *L. destructor*. Although the size of the idiosoma in these two species does not overlap it is possible that they cross and form hybrids with setae of intermediate length. A genetic or molecular analysis is needed as it is not possible to provide a definite answer on the basis of morphology. We wanted to draw attention to this taxonomic puzzle, because *L. destructor* is one of the most common species in stored grain and granaries, in house dust, bird and rodent nests. We suggest to treat *L. pilosus* and *L. destructor* as the separate species until a genetic or molecular analysis definitely resolves the question. A similar problem was raised some 40 years ago, when *Acarus siro* was divided into a complex of three species (Griffiths 1964), in which the species i.e. *A. siro*, *A. farris* and *A. immobilis*, can partially cross with one another. However, in this *Acarus* group diagnostic morphological characters were found for separating the species.

Table 2. Comparison of the length of idiosoma (µm) and sai setae (µm) of females of *Lepidoglyphus pilosus* (Oudemans) and *L. destructor* (Schrank)

no.	*L. pilosus*		*L. destructor*	
	idiosoma	sai	idiosoma	sai
1	300.00	600.00	375.00	656.25
2	237.50	437.50	400.00	531.25
3	300.00	625.00	400.00	543.75
4	318.75	643.75	375.00	625.00
5	231.25	531.25	487.50	406.25
6	300.00	718.75	456.25	531.25
7	306.25	637.50	468.75	668.75
8	206.25	656.25	418.75	625.00
9	306.25	575.00	375.00	656.25
10	262.50	518.75	500.00	825.00
11	287.50	656.25	368.75	575.00
12	300.00	600.00	425.00	531.25
13	312.50	562.25	437.50	625.00
14	306.25	718.75	412.50	625.00
15	512.50	512.50	418.75	512.50
16	287.50	687.50	368.75	606.25
17	306.25	656.25	487.50	531.25
18	250.00	625.00	406.25	531.25
19	268.75	587.50	337.50	500.00
20	287.50	600.00	375.00	531.25
21	281.25	600.00	337.50	500.00
22	306.25	687.50	425.00	531.25
23	281.25	606.25	350.00	550.00
24	306.25	718.75	356.25	531.25
25	318.75	625.00	406.25	600.00
26	–	–	437.50	625.00
27	–	–	362.50	437.50
28	–	–	462.50	625.00
29	–	–	412.50	562.50
30	–	–	412.50	581.25

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